
Supplementary Material

Estimating Dengue transmission intensity in China using dynamics catalytic models based on serological data

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1. Figures

Note that in Figures S1-S4, the blue dotted line, the green bold solid line, and the red dotted line are the 2.5%, 50% and 97.5% of the model fitting curves, respectively, and the red dots are the observation data. To make the graphs neat, the following abbreviations are used:

GZ Huangpu [4] represents Huangpu District in Guangzhou city;

QZ/FCG/HP [9] stands for Qinzhou City, Fangchenggang City and Hepu County in Guangxi;

GY/CJ/LD [15] represents Yunyan District of Guiyang City, Congjiang County of Southeast Guizhou Province and Luodian County of Guizhou province;

TP/TY/TN [20] indicates Taipei, Taoyuan and Tainan of Taiwan Province.

Figure S1. The fitting curves from the constant force of infection model (Model A) to 31 datasets

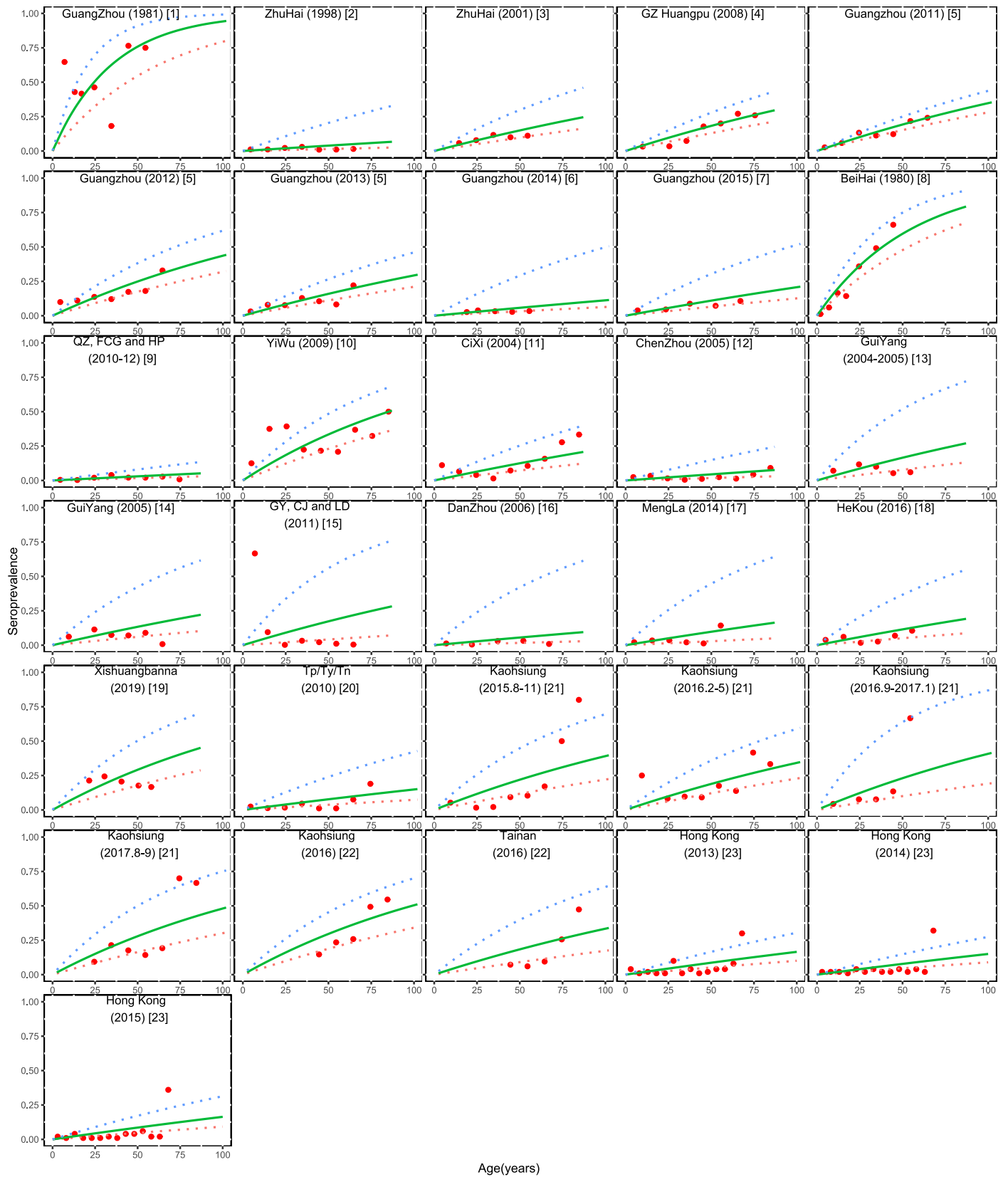


Figure S2. The fitting curves from the antibody protection decay model (Model B) to 31 datasets

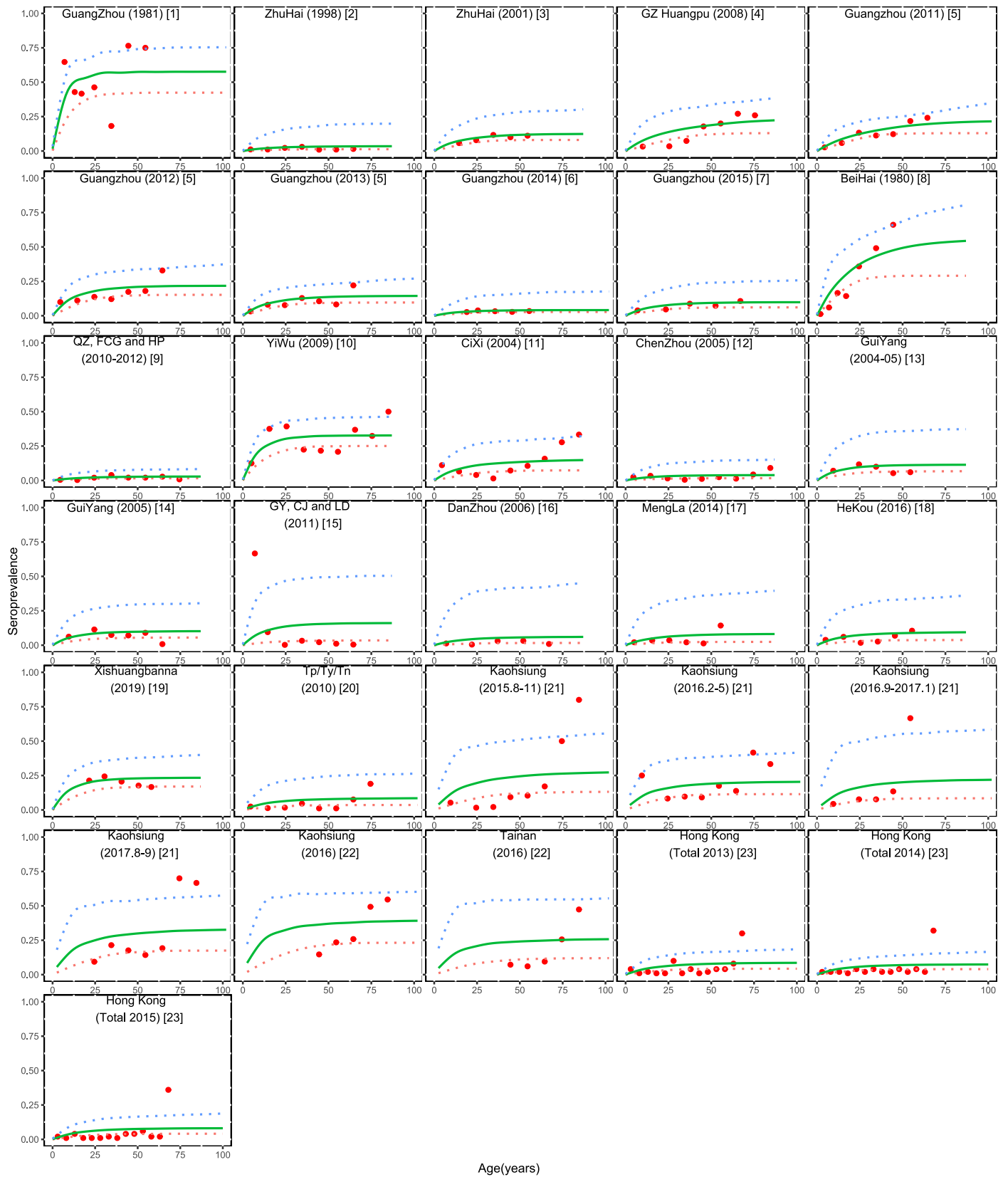


Figure S3. The fitting curves from the constant force of infection and age threshold model (Model C) to 31 datasets

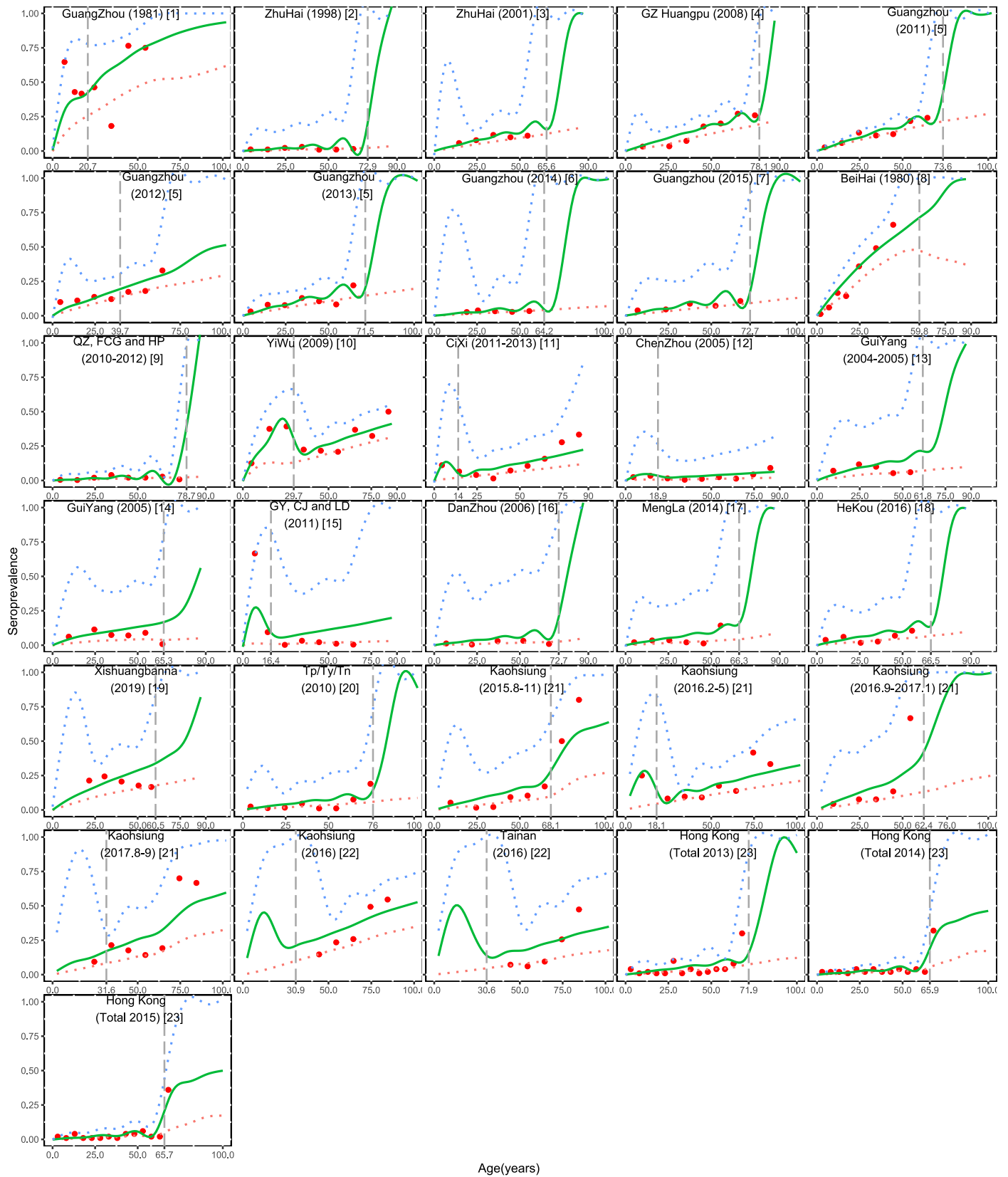


Figure S4. The fitting curves from the antibody protection decay and age threshold model (Model D) to 31 datasets

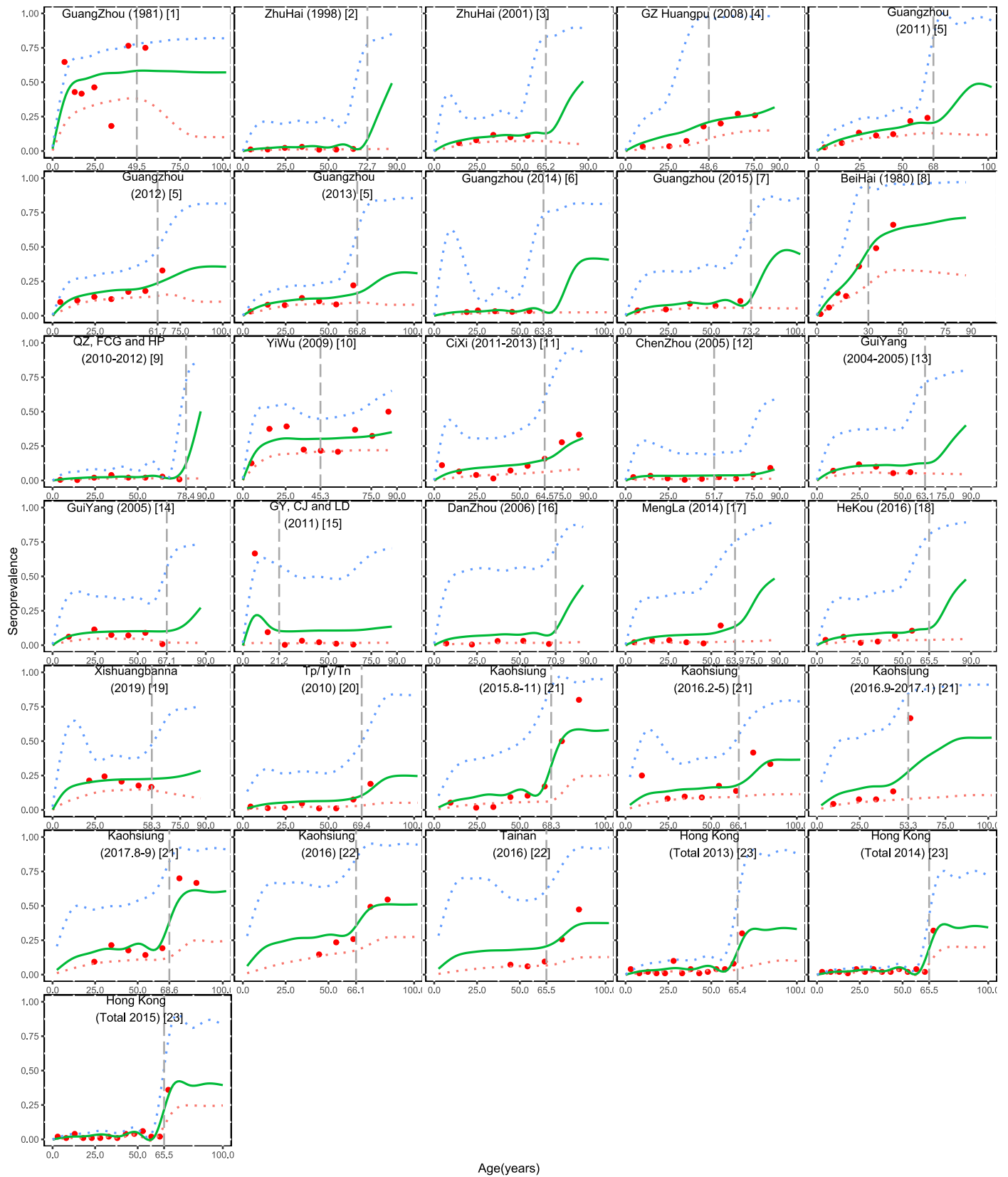
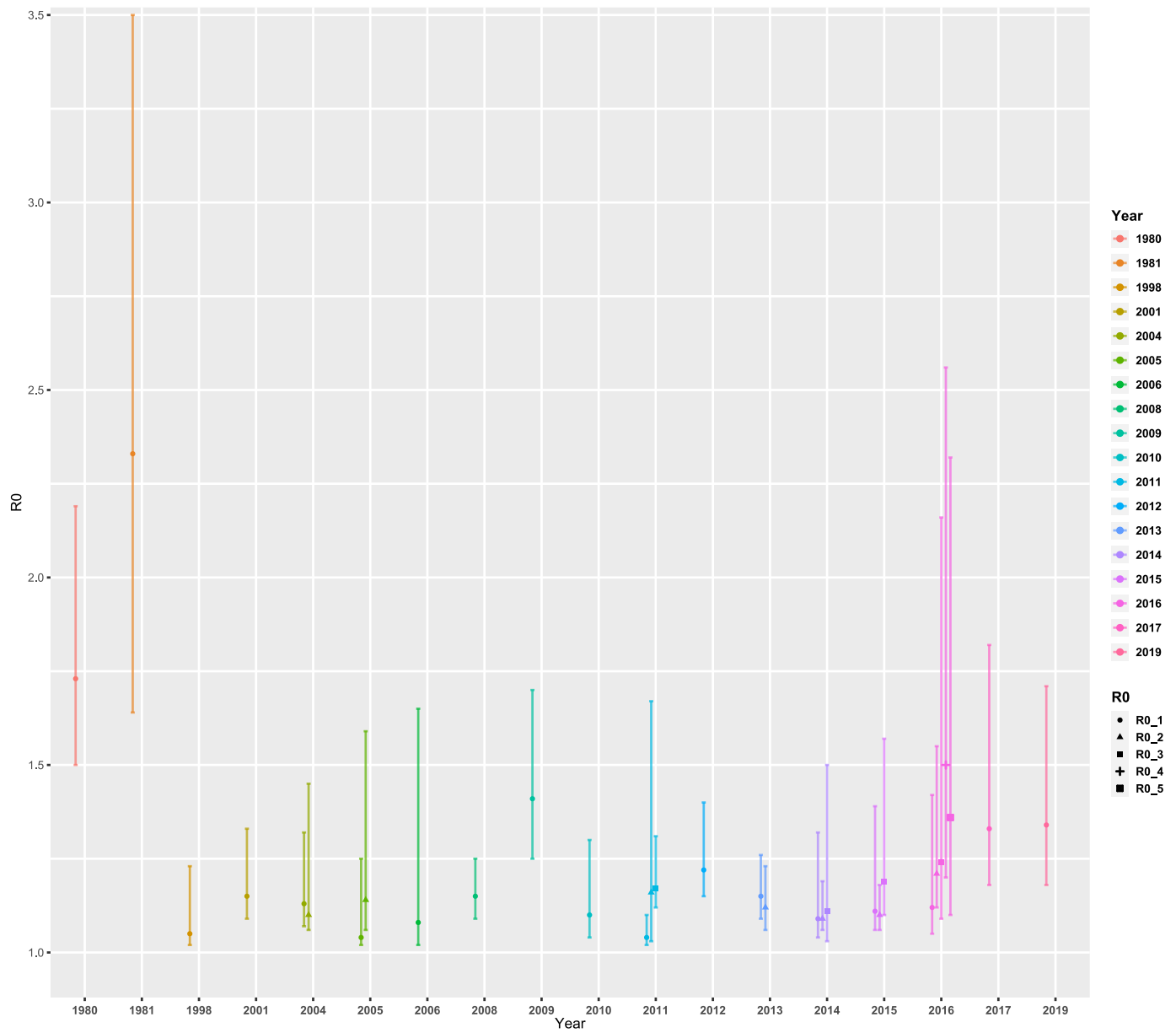


Figure S5. Distribution of R_0 in different study years



Note: R_{0_1} , R_{0_2} , R_{0_3} , R_{0_4} , R_{0_5} are the basic reproduction numbers of different data sets in the same study year, respectively.

2. Tables

Table S1: Summary of model parameter estimates for the constant force of infection model (Model A)

Survey region	Reference	Survey year	FOI (λ , 95%CrI)	R ₀ (95%CrI)	γ (95%CrI)	-LnL	DIC
Guangdong Province							
Guangzhou	Huang Y et al. [1]	1981	0.0285 (0.0158 , 0.0481)	2.35 (1.65 , 3.75)	0.20 (0.05 , 0.45)	123.54	249.46
Zhuhai	Li Z et al. [2]	1998	0.0008 (0.0003 , 0.0046)	1.03 (1.01 , 1.16)	0.04 (0.00 , 0.29)	36.20	71.95
Zhuhai	Yang Z et al. [3]	2001	0.0032 (0.0020 , 0.0071)	1.11 (1.07 , 1.25)	0.03 (0.00 , 0.20)	172.46	345.07
#GZ Huangpu	Zheng X et al. [4]	2008	0.0040 (0.0028 , 0.0065)	1.14 (1.09 , 1.23)	0.03 (0.00 , 0.14)	140.82	282.69
Guangzhou	Cao Y et al. [5]	2011-13					
		2011	0.0043 (0.0033 , 0.0058)	1.15 (1.12 , 1.21)	0.01 (0.00 , 0.05)	603.41	1208.26
		2012	0.0057 (0.0038 , 0.0096)	1.21 (1.14 , 1.37)	0.05 (0.01 , 0.18)	519.23	1040.36
		2013	0.0035 (0.0024 , 0.0062)	1.12 (1.08 , 1.23)	0.03 (0.00 , 0.12)	392.85	787.48
Guangzhou	Li S et al. [6]	2014	0.0012 (0.0007 , 0.0069)	1.04 (1.02 , 1.26)	0.05 (0.00 , 0.36)	582.55	1164.52
Guangzhou	Jing Q et al. [7]	2015	0.0023 (0.0014 , 0.0072)	1.08 (1.05 , 1.27)	0.05 (0.00 , 0.28)	207.67	415.95
Guangxi Province							
Beihai	Tian X et al. [8]	1980	0.0181 (0.0130 , 0.0277)	1.73 (1.50 , 2.19)	0.06 (0.00 , 0.20)	208.16	418.28
*QZ/FCG/HP	Zhou K et al. [9]	2010-12	0.0006 (0.0004 , 0.0017)	1.02 (1.01 , 1.05)	0.02 (0.00 , 0.11)	185.91	372.55
Zhejiang Province							
Yiwu	Sun J et al. [10]	2009	0.0081 (0.0052 , 0.0133)	1.30 (1.19 , 1.52)	0.10 (0.02 , 0.25)	221.27	444.86
Cixi	Cen D et al. [11]	2004	0.0027 (0.0015 , 0.0058)	1.11 (1.06 , 1.24)	0.05 (0.00 , 0.20)	127.22	256.27
Hunan Province							
Chenzhou	Gao L et.al. [12]	2005	0.0009 (0.0004 , 0.0032)	1.03 (1.01 , 1.11)	0.05 (0.00 , 0.23)	51.99	105.27
Guizhou Province							
Guiyang	Gao R et al. [13]	2004-05	0.0036 (0.0016 , 0.0146)	1.13 (1.06 , 1.59)	0.10 (0.02 , 0.50)	672.49	1346.25
Guiyang	Tian H et al. [14]	2005	0.0029 (0.0012 , 0.0110)	1.10 (1.04 , 1.43)	0.10 (0.01 , 0.50)	204.78	410.90
*GY/CJ/LD	Jiang W et al. [15]	2011	0.0038 (0.0008 , 0.0164)	1.14 (1.03 , 1.67)	0.30 (0.05 , 0.70)	59.94	120.93
Hainan Province							
Danzhou	Jin Y et al. [16]	2006	0.0011 (0.0003 , 0.0109)	1.04 (1.01 , 1.38)	0.12 (0.00 , 0.60)	45.15	89.21
Yunnan Province							
Mengla	Lu Y et al. [17]	2014	0.0021 (0.0006 , 0.0118)	1.07 (1.02 , 1.43)	0.10 (0.00 , 0.46)	26.48	52.97
Hekou	Pu L et al. [18]	2016	0.0024 (0.0010 , 0.0091)	1.08 (1.03 , 1.33)	0.07 (0.00 , 0.36)	39.51	79.88

Xishuangbanna	Li L et al. [19]	2019	0.0069 (0.0039 , 0.0140)	1.28 (1.15 , 1.61)	0.10 (0.02 , 0.36)	1178.3	2358.14
Taiwan Province							
% TP/TY/TN	Lee YH et al. [20]	2010	0.0016 (0.0008 , 0.0055)	1.07 (1.03 , 1.25)	0.10 (0.01 , 0.30)	184.93	374.11
Kaohsiung	Tsai JJ et al. [21]	2015-17					
		2015.8-11	0.0050 (0.0025 , 0.0119)	1.23 (1.11 , 1.60)	0.20 (0.04, 0.44)	128.97	260.08
		2016.2-5	0.0042 (0.0026 , 0.0089)	1.19 (1.11 , 1.43)	0.06 (0.00, 0.26)	111.18	223.49
		2016.9-2017.1	0.0052 (0.0021 , 0.0203)	1.24 (1.09 , 2.16)	0.10 (0.00, 0.52)	78.47	157.37
		2017.8-9	0.0066 (0.0036 , 0.0139)	1.31 (1.16 , 1.72)	0.10 (0.01, 0.39)	69.62	141.19
Kaohsiung and Tainan	Pan YH et al. [22]	2016					
Kaohsiung			0.0070 (0.0042 , 0.0121)	1.33 (1.19 , 1.61)	0.10 (0.02, 0.36)	961.22	1924.29
Tainan			0.0041 (0.0019 , 0.0102)	1.18 (1.08 , 1.50)	0.20 (0.04, 0.48)	858.61	1719.13
Hong Kong	Lee P et al. [23]	2013-15					
		2013	0.0018 (0.0011 , 0.0036)	1.08 (1.05 , 1.16)	0.06 (0.01 , 0.16)	132.91	267.96
		2014	0.0016 (0.0009 , 0.0032)	1.07 (1.04 , 1.14)	0.05 (0.01 , 0.14)	121.16	244.59
		2015	0.0018 (0.0010 , 0.0038)	1.08 (1.04 , 1.17)	0.10 (0.02 , 0.20)	118.30	238.80

Note: [#]GZ Huangpu represents Huangpu District in Guangzhou city; ^{\$}QZ/FCG/HP stands for Qinzhou City, Fangchenggang City and Hepu County in Guangxi; [&]GY/CJ/LD represents Yunyan District of Guiyang City, Congjiang County of Southeast Guizhou Province and Luodian County of Guizhou Province; [%]TP/TY/TN indicates Taipei, Taoyuan and Tainan of Taiwan Province.

Table S2: Summary of model parameter estimates of the antibody protection decay model (Model B)

Survey region	Reference	Survey year	α (95%CrI)	FOI (λ , 95%CrI)	R_0 (95%CrI)	γ (95%CrI)	-LnL	DIC
Guangdong Province								
Guangzhou	Huang Y et al. [1]	1981	0.07 (0.02 , 0.10)	0.0910 (0.0368 , 0.1456)	2.16 (1.64 , 3.05)	0.10 (0.03 , 0.41)	121.66	245.36
Zhuhai	Li Z et al. [2]	1998	0.07 (0.01 , 0.10)	0.0024 (0.0007 , 0.0162)	1.03 (1.01 , 1.18)	0.05 (0.00 , 0.37)	35.14	69.96
Zhuhai	Yang Z et al. [3]	2001	0.06 (0.01 , 0.10)	0.0083 (0.0034 , 0.0233)	1.11 (1.07 , 1.31)	0.03 (0.00 , 0.22)	171.83	343.78
# GZ Huangpu	Zheng X et al. [4]	2008	0.03 (0.00 , 0.10)	0.0094 (0.0037 , 0.0326)	1.17 (1.10 , 1.40)	0.07 (0.00 , 0.27)	143.90	287.56
Guangzhou	Cao Y et al. [5]	2011-13						
		2011	0.03 (0.00 , 0.09)	0.0077 (0.0042 , 0.0223)	1.16 (1.12 , 1.27)	0.03 (0.00 , 0.12)	605.33	1210.97
		2012	0.07 (0.01 , 0.10)	0.0176 (0.0068 , 0.0367)	1.22 (1.15 , 1.41)	0.05 (0.01 , 0.19)	518.33	1038.56
		2013	0.06 (0.01 , 0.10)	0.0100 (0.0041 , 0.0229)	1.13 (1.09 , 1.25)	0.03 (0.00 , 0.14)	391.98	785.54
Guangzhou	Li S et al. [6]	2014	0.07 (0.01 , 0.10)	0.0030 (0.0014 , 0.0130)	1.03 (1.02 , 1.16)	0.02 (0.00 , 0.21)	579.54	1156.73
Guangzhou	Jing Q et al. [7]	2015	0.07 (0.01 , 0.10)	0.0069 (0.0027 , 0.0196)	1.09 (1.05 , 1.25)	0.03 (0.00 , 0.23)	205.89	411.70
Guangxi Province								
Beihai	Tian X et al. [8]	1980	0.02 (0.00 , 0.10)	0.0269 (0.0148 , 0.0790)	1.62 (1.32 , 2.18)	0.10 (0.01 , 0.37)	211.03	422.83
^s QZ/FCG/HP	Zhou K et al. [9]	2010-12	0.07 (0.02 , 0.10)	0.0019 (0.0008 , 0.0062)	1.02 (1.01 , 1.06)	0.02 (0.00 , 0.10)	184.17	368.74
Zhejiang Province								
Yiwu	Sun J et al. [10]	2009	0.08 (0.03 , 0.10)	0.0366 (0.0168 , 0.0636)	1.41 (1.28 , 1.69)	0.05 (0.00 , 0.17)	217.26	436.63
Cixi	Cen D et al. [11]	2004	0.06 (0.00 , 0.10)	0.0094 (0.0025 , 0.0300)	1.13 (1.06 , 1.36)	0.10 (0.01 , 0.32)	128.71	258.88
Hunan Province								
Chenzhou	Gao L et.al. [12]	2005	0.08 (0.02 , 0.10)	0.0028 (0.0009 , 0.0113)	1.03 (1.01 , 1.13)	0.04 (0.00 , 0.23)	50.45	101.58
Guizhou Province								
Guiyang	Gao R et al. [13]	2004-05	0.08 (0.02 , 0.10)	0.0092 (0.0038 , 0.0358)	1.10 (1.06 , 1.45)	0.08 (0.01 , 0.38)	669.62	1339.97
Guiyang	Tian H et al. [14]	2005	0.08 (0.02 , 0.10)	0.0082 (0.0032 , 0.0316)	1.09 (1.05 , 1.34)	0.08 (0.00 , 0.39)	201.53	403.67
& GY/CJ/LD	Jiang W et al. [15]	2011	0.08 (0.02 , 0.10)	0.0128 (0.0021 , 0.0697)	1.15 (1.03 , 1.81)	0.30 (0.04 , 0.71)	58.17	117.36
Hainan Province								
Danzhou	Jin Y et al. [16]	2006	0.07 (0.01 , 0.10)	0.0039 (0.0008 , 0.0455)	1.05 (1.01 , 1.55)	0.10 (0.00 , 0.64)	45.10	88.84
Yunnan Province								
Mengla	Lu Y et al. [17]	2014	0.07 (0.01 , 0.10)	0.0052 (0.0013 , 0.0389)	1.06 (1.02 , 1.42)	0.10 (0.00 , 0.50)	26.05	51.99
Hekou	Pu L et al. [18]	2016	0.07 (0.01 , 0.10)	0.0065 (0.0018 , 0.0363)	1.08 (1.03 , 1.38)	0.08 (0.00 , 0.43)	39.24	79.23
Xishuangbanna	Li L et al. [19]	2019	0.08 (0.02 , 0.10)	0.0229 (0.0097 , 0.0450)	1.25 (1.17 , 1.49)	0.04 (0.03 , 0.23)	1174.73	2349.94
Taiwan Province								

% TP/TY/TN	Lee YH et al. [20]	2010	0.07 (0.01 , 0.10)	0.0056 (0.0016 , 0.0228)	1.07 (1.03 , 1.27)	0.10 (0.02 , 0.38)	185.17	371.79
Kaohsiung	Tsai JJ et al. [21]	2015-17						
		2015.8-11	0.05 (0.00 , 0.10)	0.0167 (0.0042 , 0.0682)	1.28 (1.12 , 1.87)	0.20 (0.07 , 0.54)	130.86	263.05
		2016.2-5	0.07 (0.01 , 0.10)	0.0151 (0.0048 , 0.0487)	1.21 (1.11 , 1.56)	0.10 (0.00 , 0.31)	111.74	225.02
		2016.9-2017.1	0.06 (0.07 , 0.10)	0.0143 (0.0039 , 0.0785)	1.22 (1.08 , 2.03)	0.10 (0.00 , 0.55)	78.95	158.18
		2017.8-9	0.06 (0.00 , 0.10)	0.0239 (0.0059 , 0.0851)	1.37 (1.17 , 2.04)	0.20 (0.02 , 0.46)	71.24	143.92
Kaohsiung and Tainan	Pan YH et al. [22]	2016						
Kaohsiung			0.06 (0.01 , 0.10)	0.0366 (0.0079 , 0.1062)	1.51 (1.24 , 2.28)	0.20 (0.04 , 0.46)	963.13	1927.82
Tainan			0.07 (0.01 , 0.10)	0.0204 (0.0043 , 0.0883)	1.28 (1.11 , 2.07)	0.20 (0.06 , 0.59)	859.77	1721.15
Hong Kong	Lee P et al. [23]	2013-15						
		2013	0.06 (0.01 , 0.10)	0.0053 (0.0018 , 0.0148)	1.07 (1.04 , 1.17)	0.10 (0.02 , 0.21)	133.24	268.73
		2014	0.07 (0.01 , 0.10)	0.0051 (0.0018 , 0.0123)	1.07 (1.04 , 1.14)	0.10 (0.02 , 0.17)	120.86	244.05
		2015	0.07 (0.01 , 0.10)	0.0054 (0.0019 , 0.0146)	1.07 (1.04 , 1.17)	0.10 (0.02 , 0.26)	118.23	238.72

Note: # GZ Huangpu represents Huangpu District in Guangzhou city; \$ QZ/FCG/HP stands for Qinzhou City, Fangchenggang City and Hepu County in Guangxi; & GY/CJ/LD represents Yunyan

District of Guiyang City, Congjiang County of Southeast Guizhou Province and Luodian County of Guizhou Province; % TP/TY/TN indicates Taipei, Taoyuan and Tainan of Taiwan Province.

Table S3: Summary of model parameter estimates from constant force of infection and age threshold model (Model C)

Survey region	Reference	Survey year	A_{crit} (95%CI)	λ_1 (95%CrI)	λ_2 (95%CrI)	R_0 (95%CrI)	γ (95%CrI)	-LnL	DIC
Guangdong Province									
Guangzhou	Huang Y et al. [1]	1981	20.7 (9.9, 82.1)	0.0538 (0.0184, 0.1440)	0.0269 (0.0094, 0.1348)	2.33 (1.64, 3.50)	0.10 (0.02, 0.41)	122.80	240.45
Zhuhai	Li Z et al. [2]	1998	72.9 (11.6, 83.8)	0.0009 (0.0003, 0.0236)	0.0595 (0.0004, 0.1447)	1.05 (1.02, 1.23)	0.05 (0.00, 0.39)	35.26	61.68
Zhuhai	Yang Z et al. [3]	2001	65.6 (10.3, 83.3)	0.0034 (0.0021, 0.1238)	0.0585 (0.0022, 0.1448)	1.15 (1.09, 1.33)	0.04 (0.00, 0.23)	172.53	294.39
# GZ Huangpu	Zheng X et al. [4]	2008	78.1 (9.9, 84.1)	0.0041 (0.0019, 0.0533)	0.0428 (0.0028, 0.1446)	1.15 (1.09, 1.25)	0.03 (0.00, 0.16)	140.92	177.13
Guangzhou	Cao Y et al. [5]	2011-13							
		2011	73.6 (15.6, 84.0)	0.0043 (0.0034, 0.0073)	0.0669 (0.0032, 0.1465)	1.18 (1.13, 1.25)	0.01 (0.00, 0.06)	603.45	1207.90
		2012	39.7 (9.9, 83.1)	0.0078 (0.0041, 0.0598)	0.0071 (0.0034, 0.1400)	1.22 (1.15, 1.40)	0.05 (0.00, 0.18)	518.73	955.25
		2013	71.5 (12.2, 83.9)	0.0037 (0.0024, 0.0175)	0.0532 (0.0022, 0.1447)	1.15 (1.09, 1.26)	0.03 (0.00, 0.14)	392.87	717.46
Guangzhou	Li S et al. [6]	2014	64.2 (10.4, 83.7)	0.0014 (0.0007, 0.1331)	0.0476 (0.0007, 0.1450)	1.09 (1.04, 1.32)	0.05 (0.00, 0.38)	582.51	966.85
Guangzhou	Jing Q et al. [7]	2015	72.7 (11.7, 84.0)	0.0027 (0.0014, 0.0308)	0.0517 (0.0014, 0.1444)	1.11 (1.06, 1.39)	0.06 (0.00, 0.37)	207.78	355.98
Guangxi Province									
Beihai	Tian X et al. [8]	1980	59.8 (17.1, 83.1)	0.0176 (0.0102, 0.0277)	0.0560 (0.0054, 0.1452)	1.80 (1.51, 2.26)	0.05 (0.00, 0.20)	208.12	417.75
\$ QZ/FCG/HP	Zhou K et al. [9]	2010-12	78.7 (13.1, 84.2)	0.0006 (0.0003, 0.0064)	0.0606 (0.0003, 0.1450)	1.04 (1.02, 1.10)	0.02 (0.00, 0.16)	185.87	193.52
Zhejiang Province									
Yiwu	Sun J et al. [10]	2009	29.7 (16.1, 42.0)	0.0252 (0.0122, 0.0559)	0.0061 (0.0043, 0.0093)	1.41 (1.25, 1.70)	0.04 (0.00, 0.15)	215.09	433.33
Cixi	Cen D et al. [11]	2004	14.0 (9.7, 81.9)	0.0238 (0.0016, 0.1317)	0.0029 (0.0015, 0.0205)	1.13 (1.07, 1.32)	0.07 (0.00, 0.24)	127.08	218.66
Hunan Province									
Chenzhou	Gao L et al. [12]	2005	18.9 (9.9, 75.4)	0.0055 (0.0009, 0.0514)	0.0007 (0.0002, 0.0044)	1.04 (1.01, 1.20)	0.06 (0.00, 0.32)	50.64	101.25
Guizhou Province									
Guiyang	Gao R et al. [13]	2004-05	61.8 (11.5, 83.3)	0.0046 (0.0017, 0.0489)	0.0393 (0.0012, 0.1453)	1.18 (1.07, 1.73)	0.10 (0.01, 0.51)	672.33	1339.04
Guiyang	Tian H et al. [14]	2005	65.3 (11.4, 83.6)	0.0047 (0.0014, 0.0669)	0.0094 (0.0006, 0.1426)	1.14 (1.06, 1.59)	0.10 (0.01, 0.55)	204.61	362.19
& GY/CJ/LD	Jiang W et al. [15]	2011	16.4 (9.9, 80.8)	0.0469 (0.0020, 0.1449)	0.0025 (0.0004, 0.1269)	1.16 (1.03, 1.67)	0.20 (0.02, 0.65)	57.27	80.41
Hainan Province									
Danzhou	Jin Y et al. [16]	2006	72.7 (11.3, 84.0)	0.0017 (0.0004, 0.0706)	0.0462 (0.0006, 0.1447)	1.08 (1.02, 1.65)	0.10 (0.00, 0.68)	46.05	53.5
Yunnan Province									
Mengla	Lu Y et al. [17]	2014	66.3 (11.1, 83.4)	0.0024 (0.0007, 0.0554)	0.0538 (0.0010, 0.1448)	1.11 (1.03, 1.50)	0.10 (0.00, 0.50)	26.54	46.74
Hekou	Pu L et al. [18]	2016	66.5 (11.0, 83.7)	0.0028 (0.0011, 0.0409)	0.0551 (0.0012, 0.1441)	1.12 (1.05, 1.42)	0.08 (0.00, 0.39)	39.58	72.62
Xishuangbanna	Li L et al. [19]	2019	60.5 (10.9, 83.3)	0.0086 (0.0040, 0.1340)	0.0199 (0.0031, 0.1439)	1.34 (1.18, 1.71)	0.10 (0.01, 0.38)	1178.12	2321.00
Taiwan Province									

% TP/TY/TN	Lee YH et al. [20]	2010	76.00 (10.2,84.0)	0.0021 (0.0008 , 0.0545)	0.0262 (0.0009 , 0.1436)	1.10 (1.04 , 1.30)	0.10 (0.01 , 0.33)	184.95	278.49
Kaohsiung	Tsai JJ et al. [21]	2015-17							
		2015.8-11	68.1 (11.4 , 83.1)	0.0034 (0.0014 , 0.0782)	0.0099 (0.0031 , 0.0419)	1.19 (1.10 , 1.57)	0.10 (0.00 , 0.43)	127.49	238.28
		2016.2-5	18.1 (10.0 , 76.2)	0.0389 (0.0033 , 0.1195)	0.0039 (0.0023 , 0.0108)	1.23 (1.13 , 1.47)	0.05 (0.00 , 0.23)	109.39	220.42
		2016.9-2017.1	62.4 (12.8 , 83.3)	0.0057 (0.0021 , 0.0539)	0.0493 (0.0028 , 0.1449)	1.44 (1.14 , 2.38)	0.10 (0.00 , 0.51)	78.63	155.99
		2017.8-9	31.6 (10.3 , 81.5)	0.0097 (0.0026 , 0.1428)	0.0089 (0.0039 , 0.0370)	1.33 (1.18 , 1.82)	0.10 (0.00 , 0.38)	69.28	114.74
Kaohsiung/Tainan	Pan YH et al. [22]	2016							
Kaohsiung			30.9 (10.5 , 74.3)	0.0553 (0.0026 , 0.1447)	0.0073 (0.0043 , 0.0133)	1.50 (1.20 , 2.56)	0.10 (0.00 , 0.36)	961.12	1922.57
Tainan			30.6 (10.2 , 79.7)	0.0617 (0.0015 , 0.1461)	0.0042 (0.0019 , 0.0133)	1.36 (1.10 , 2.32)	0.10 (0.03 , 0.48)	858.53	1718.03
Hong Kong	Lee P et al. [23]	2013-15							
		2013	71.9 (44.8 , 83.8)	0.0017 (0.0008 , 0.0128)	0.0299 (0.0013 , 0.1450)	1.12 (1.06 , 1.23)	0.05 (0.00 , 0.18)	132.62	233.79
		2014	65.9 (30.2 , 81.5)	0.0010 (0.0005 , 0.0037)	0.0063 (0.0019 , 0.1252)	1.09 (1.06 , 1.19)	0.02 (0.00 , 0.09)	113.46	213.28
		2015	65.7 (17.6 , 81.8)	0.0009 (0.0005 , 0.0057)	0.0070 (0.0019 , 0.1263)	1.10 (1.06 , 1.18)	0.02 (0.00 , 0.12)	109.87	213.16

Note: # GZ Huangpu represents Huangpu District in Guangzhou city; \$ QZ/FCG/HP stands for Qinzhou City, Fangchenggang City and Hepu County in Guangxi; & GY/CJ/LD represents Yunyan

District of Guiyang City, Congjiang County of Southeast Guizhou Province and Luodian County of Guizhou Province; % TP/TY/TN indicates Taipei, Taoyuan and Tainan of Taiwan Province.

Table S4: Summary of model parameter estimates from antibody protection decay and age threshold model (Model D)

Survey region	Reference	Survey	A_{crit} (95%CrI)	α (95%CrI)	λ_1 (95%CrI)	λ_2 (95%CrI)	R_0 (95%CrI)	γ (95%CrI)	-LnL	DIC
Guangdong Province										
Guangzhou	Huang Y et al. [1]	1981	49.5 (10.9, 82.8)	0.07 (0.02, 0.10)	0.0904 (0.0361, 0.1444)	0.0873 (0.0071, 0.1471)	2.13 (1.58, 3.06)	0.10 (0.02, 0.40)	121.71	245.20
Zhuhai	Li Z et al. [2]	1998	72.7 (13.0, 83.9)	0.07 (0.01, 0.10)	0.0025 (0.0007, 0.0353)	0.0588 (0.0010, 0.1458)	1.04 (1.01, 1.25)	0.06 (0.00, 0.45)	85.41	68.96
Zhuhai	Yang Z et al. [3]	2001	65.2 (11.2, 83.5)	0.07 (0.01, 0.10)	0.0086 (0.0033, 0.0916)	0.0602 (0.0024, 0.1457)	1.13 (1.08, 1.33)	0.04 (0.00, 0.23)	171.97	340.67
# GZ Huangpu	Zheng X et al. [4]	2008	48.6 (13.6, 83.3)	0.06 (0.00, 0.10)	0.0078 (0.0015, 0.0353)	0.0284 (0.0055, 0.1369)	1.17 (1.09, 2.00)	0.06 (0.00, 0.28)	143.07	280.55
Guangzhou	Cao Y et al. [5]	2011-13								
		2011	68.0 (15.5, 83.3)	0.04 (0.00, 0.10)	0.0085 (0.0040, 0.0237)	0.0356 (0.0039, 0.1442)	1.17 (1.12, 1.31)	0.03 (0.00, 0.14)	605.08	1198.32
		2012	61.7 (11.9, 83.1)	0.07 (0.01, 0.10)	0.0174 (0.0075, 0.0448)	0.0415 (0.0054, 0.1407)	1.22 (1.15, 1.42)	0.04 (0.00, 0.20)	517.77	1035.76
		2013	66.8 (15.7, 83.7)	0.07 (0.01, 0.10)	0.0099 (0.0039, 0.0236)	0.0329 (0.0048, 0.1441)	1.14 (1.09, 1.26)	0.03 (0.00, 0.15)	391.61	778.47
Guangzhou	Li S et al. [6]	2014	63.8 (10.4, 83.5)	0.07 (0.01, 0.10)	0.0034 (0.0014, 0.1353)	0.0477 (0.0009, 0.1458)	1.06 (1.03, 1.20)	0.03 (0.00, 0.26)	579.46	1054.96
Guangzhou	Jing Q et al. [7]	2015	73.2 (14.0, 83.9)	0.07 (0.01, 0.10)	0.0073 (0.0027, 0.0455)	0.0549 (0.0031, 0.1455)	1.10 (1.06, 1.45)	0.05 (0.00, 0.37)	206.43	399.75
Guangxi Province										
Beihai	Tian X et al. [8]	1980	30.0 (12.0, 80.8)	0.03 (0.00, 0.10)	0.0199 (0.0095, 0.0585)	0.0836 (0.0128, 0.1450)	1.81 (1.40, 3.19)	0.07 (0.00, 0.27)	208.89	418.60
\$ QZ/FCG/HP	Zhou K et al. [9]	2010-12	78.4 (14.5, 84.2)	0.07 (0.02, 0.10)	0.0019 (0.0007, 0.0096)	0.0594 (0.0008, 0.1450)	1.03 (1.02, 1.09)	0.02 (0.00, 0.14)	184.32	309.73
Zhejiang Province										
Yiwu	Sun J et al. [10]	2009	45.3 (11.1, 83.3)	0.08 (0.02, 0.10)	0.0413 (0.0184, 0.1223)	0.0415 (0.0103, 0.1333)	1.42 (1.27, 1.76)	0.05 (0.00, 0.19)	217.04	432.83
Cixi	Cen D et al. [11]	2004	64.5 (11.1, 83.2)	0.07 (0.00, 0.10)	0.0086 (0.0020, 0.0952)	0.0294 (0.0040, 0.1363)	1.13 (1.06, 1.45)	0.10 (0.00, 0.34)	128.1	252.85
Hunan Province										
Chenzhou	Gao L et al. [12]	2005	51.7 (10.3, 83.7)	0.08 (0.02, 0.10)	0.0047 (0.0011, 0.0537)	0.0061 (0.0006, 0.1033)	1.04 (1.02, 1.25)	0.06 (0.00, 0.41)	50.89	88.01
Guizhou Province										
Guiyang	Gao R et al. [13]	2004-05	63.1 (12.8, 83.6)	0.08 (0.02, 0.10)	0.0105 (0.0042, 0.0580)	0.0458 (0.0030, 0.1442)	1.13 (1.07, 1.52)	0.09 (0.00, 0.44)	669.78	1338.69
Guiyang	Tian H et al. [14]	2005	67.1 (13.5, 83.5)	0.08 (0.02, 0.10)	0.0099 (0.0038, 0.0698)	0.0259 (0.0011, 0.1442)	1.11 (1.06, 1.46)	0.10 (0.00, 0.44)	201.76	392.70
& GY/CJ/LD	Jiang W et al. [15]	2011	21.2 (9.8, 82.4)	0.07 (0.02, 0.10)	0.0446 (0.0032, 0.1440)	0.0110 (0.0009, 0.1362)	1.15 (1.03, 1.78)	0.20 (0.02, 0.68)	57.11	103.69
Hainan Province										

Danzhou	Jin Y et al. [16]	2006	70.9 (12.3 , 83.9)	0.07 (0.01 , 0.10)	0.0068 (0.0009 , 0.1010)	0.0472 (0.0014 , 0.1441)	1.08 (1.02 , 1.90)	0.10 (0.00 , 0.70)	46.31	83.41
Yunnan Province										
Mengla	Lu Y et al. [17]	2014	63.9 (12.0 , 83.5)	0.07 (0.01 , 0.10)	0.0064 (0.0013 , 0.0635)	0.0612 (0.0024 , 0.1439)	1.10 (1.03 , 1.51)	0.10 (0.00 , 0.52)	26.49	52.05
Hekou	Pu L et al. [18]	2016	65.5 (12.6 , 83.5)	0.07 (0.01 , 0.10)	0.0071 (0.0019 , 0.0569)	0.0569 (0.0027 , 0.1450)	1.11 (1.04 , 1.55)	0.10 (0.00 , 0.50)	39.47	78.80
Xishuangbanna	Li L et al. [19]	2019	58.3 (10.6 , 82.8)	0.08 (0.02 , 0.10)	0.0269 (0.0090 , 0.1402)	0.0292 (0.0047 , 0.1427)	1.28 (1.18 , 1.56)	0.05 (0.00 , 0.24)	1174.84	2337.87
Taiwan Province										
% TP/TY/TN	Lee YH et al. [20]	2010	69.4 (11.8 , 83.7)	0.08 (0.01 , 0.10)	0.0049 (0.0014 , 0.0549)	0.0246 (0.0032 , 0.1411)	1.08 (1.04 , 1.37)	0.10 (0.01 , 0.41)	184.58	362.70
Kaohsiung	Tsai JJ et al. [21]	2015-17								
		2015.8-11	68.3 (21.8 , 81.6)	0.06 (0.00 , 0.10)	0.0079 (0.0022 , 0.0455)	0.0774 (0.0145 , 0.1455)	1.20 (1.10 , 1.69)	0.10 (0.01 , 0.43)	127.08	256.07
		2016.2-5	66.1 (11.0 , 83.0)	0.07 (0.01 , 0.10)	0.0155 (0.0046 , 0.1169)	0.0397 (0.0056 , 0.1368)	1.21 (1.12 , 1.55)	0.07 (0.00 , 0.31)	111.01	213.90
		2016.9-2017.1	53.3 (13.4 , 83.1)	0.06 (0.01 , 0.10)	0.0141 (0.0036 , 0.0915)	0.0691 (0.0060 , 0.1447)	1.36 (1.10 , 2.17)	0.10 (0.00 , 0.54)	78.94	158.29
		2017.8-9	68.6 (15.7 , 81.3)	0.06 (0.01 , 0.10)	0.0148 (0.0044 , 0.0957)	0.0913 (0.0149 , 0.1465)	1.30 (1.16 , 1.89)	0.10 (0.00 , 0.37)	67.55	131.94
Kaohsiung/Tainan	Pan YH et al. [22]	2016								
Kaohsiung			66.1 (12.3 , 81.6)	0.07 (0.00 , 0.10)	0.0276 (0.0043 , 0.1341)	0.0684 (0.0159 , 0.1414)	1.40 (1.21 , 2.28)	0.10 (0.00 , 0.42)	961.70	1918.96
Tainan			65.5 (12.5 , 83.5)	0.07 (0.00 , 0.10)	0.0181 (0.0022 , 0.1406)	0.0388 (0.0061 , 0.1375)	1.25 (1.09 , 1.99)	0.20 (0.01 , 0.53)	859.07	1712.92
Hong Kong	Lee P et al. [23]	2013-15								
		2013	65.4 (49.5 , 80.3)	0.08 (0.01 , 0.10)	0.0037 (0.0012 , 0.0105)	0.0357 (0.0069 , 0.1322)	1.09 (1.06 , 1.20)	0.03 (0.00 , 0.14)	128.19	259.91
		2014	65.5 (63.1 , 67.9)	0.08 (0.01 , 0.10)	0.0028 (0.0012 , 0.0052)	0.0402 (0.0152 , 0.0930)	1.08 (1.06 , 1.15)	0.01 (0.00 , 0.04)	110.84	224.07
		2015	65.5 (63.1 , 67.9)	0.08 (0.01 , 0.10)	0.0026 (0.0009 , 0.0053)	0.0480 (0.0169 , 0.1151)	1.09 (1.06 , 1.17)	0.01 (0.00 , 0.50)	108.42	218.93

Note: # GZ Huangpu represents Huangpu District in Guangzhou city; \$ QZ/FCG/HP stands for Qinzhou City, Fangchenggang City and Hepu County in Guangxi; & GY/CJ/LD represents Yunyan District of Guiyang City, Congjiang County of Southeast Guizhou Province and Luodian County of Guizhou Province; % TP/TY/TN indicates Taipei, Taoyuan and Tainan of Taiwan Province.

Table S5: Comparison of -LnL and DIC among different models (Model A-D) fitted to 31 data sets

Survey region	Author	Survey Year	-LnL				DIC				Applicable model
Guangdong Province			Model A	Model B	Model C	Model D	Model A	Model B	Model C	Model D	
Guangzhou	Huang Y et al. [1]	1981	123.54	121.66	122.80	121.71	249.46	245.36	240.45	245.20	Model C
Zhuhai	Li Z et al. [2]	1998	36.20	35.14	35.26	85.41	71.95	69.96	61.68	68.96	Model C
Zhuhai	Yang Z et al. [3]	2001	172.46	171.83	172.53	171.97	345.07	343.78	294.39	340.67	Model C
# GZ Huangpu	Zheng X et al. [4]	2008	140.82	143.90	140.92	143.07	282.69	287.56	177.13	280.55	Model C
Guangzhou	Cao Y et al. [5]	2011-13									
		2011	603.41	605.33	603.45	605.08	1208.26	1210.97	1207.90	1198.32	Model D
		2012	519.23	518.33	518.73	1231.66	1040.36	1038.56	955.25	1035.76	Model C
		2013	392.85	391.98	392.87	391.61	787.48	785.54	717.46	778.47	Model C
Guangzhou	Li S et al. [6]	2014	582.55	579.54	582.51	579.46	1164.52	1156.73	966.85	1054.96	Model C
Guangzhou	Jing Q et al. [7]	2015	207.67	205.89	207.78	206.43	415.95	411.70	355.98	399.75	Model C
Guangxi Province											
Beihai	Tian X et al. [8]	1980	208.16	211.03	208.12	208.89	418.28	422.83	417.75	418.60	Model A
⁵ QZ/FCG/HP	Zhou K et al. [9]	2010-12	185.91	184.17	185.87	184.32	372.55	368.74	193.52	309.73	Model C
Zhejiang Province											
Yiwu	Sun J et al. [10]	2009	221.27	217.26	215.09	217.04	444.86	436.63	433.33	432.83	Model C
Cixi	Cen D et al. [11]	2004	127.22	128.71	127.08	128.1	256.27	258.88	218.66	252.85	Model C
Hunan Province											
Chenzhou	Gao L et.al. [12]	2005	51.99	50.45	50.64	51.48	105.27	101.58	101.25	88.01	Model D
Guizhou Province											
Guiyang	Gao R et al. [13]	2004-05	672.49	669.62	672.33	669.78	1346.25	1339.97	1339.04	1338.69	Model B
Guiyang	Tian H et al. [14]	2005	204.78	201.53	204.61	201.76	410.90	403.67	362.19	392.70	Model C
& GY/CJ/LD	Jiang W et al. [15]	2011	59.94	58.17	57.27	57.11	120.93	117.36	80.41	103.69	Model C
Hainan Province											
Danzhou	Jin Y et al. [16]	2006	45.15	45.10	46.05	46.31	89.21	88.84	53.5	83.41	Model C
Yunnan Province											
Mengla	Lu Y et al. [17]	2014	26.48	26.05	26.54	26.49	52.97	51.99	46.74	52.05	Model C
Hekou	Pu L et al. [18]	2016	39.51	39.24	39.58	39.47	79.88	79.23	72.62	78.80	Model C
Xishuangbanna	Li L et al. [19]	2019	1178.3	1174.73	1178.12	1174.84	2358.14	2349.94	2321.00	2337.87	Model C

Taiwan Province											
% TP/TY/TN	Lee YH et al. [20]	2010	184.93	185.17	184.95	184.58	374.11	371.79	278.49	362.70	Model C
Kaohsiung	Tsai JJ et al. [21]	2015-17									
		2015.8-11	128.97	130.86	127.49	127.08	260.08	263.05	238.28	256.07	Model C
		2016.2-5	111.18	111.74	109.39	111.01	223.49	225.02	220.42	213.90	Model D
		2016.9-2017.1	78.47	78.95	78.63	78.94	157.37	158.18	155.99	158.29	Model A
		2017.8-9	69.62	71.24	69.28	67.55	141.19	143.92	114.74	131.94	Model C
Kaohsiung/Tainan	Pan YH et al. [22]	2016									
Kaohsiung			961.22	963.13	961.12	961.7	1924.29	1927.82	1922.57	1918.96	Model C
Tainan			858.61	859.77	858.53	859.07	1719.13	1721.15	1718.03	1712.92	Model C
Hong Kong	Lee P et al. [23]	2013-15									
		2013	132.91	133.24	132.62	128.19	267.96	268.73	233.79	259.91	Model C
		2014	121.16	120.86	113.46	110.84	244.59	244.05	213.28	224.07	Model C
		2015	118.30	118.23	109.87	108.42	238.80	238.72	213.16	218.93	Model C

Note: #GZ Huangpu represents Huangpu District in Guangzhou city; \$QZ/FCG/HP stands for Qinzhou City, Fangchenggang City and Hepu County in Guangxi; &GY/CJ/LD represents Yunyan District of Guiyang City, Congjiang County of Southeast Guizhou Province and Luodian County of Guizhou Province; %TP/TY/TN indicates Taipei, Taoyuan and Tainan of Taiwan Province.

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