Table S1- PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	4
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	5
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	5
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5-6
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	6 & 17 (Table 1)
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	6
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6-7
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	7
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	7

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Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	7 & Table S2
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	7
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7 & 16 (Fig.1)
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7-8 & Table S3
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	8, 18-19 (Table 2), 20 (Table 3)
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	8-11 & Tables 4-7
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	8-11
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	21 & Tables 2,3 & 8
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	Not applicable
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	13
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	11-12
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	13
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	2-3

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

Table S2- Parameters used for the qualitative assessment of risk of bias of included mathematical modelling and time-series analysis studies.

Parameters assessed	Explanation
Research question(s) posed	• Level of precision and clarity of questions to be addressed
Primary findings of the study presented.	• Quantitative description of outcomes of interest
Originality of findings obtained.	• Are the results and approach taken in this study novel compared to previous studies? • How do findings agree/ disagree with previous studies?
Model techniques used for the purpose of the study.	• Description of type of mathematical model used
Model structure used	• Explanatory diagram and/or equations presented for clarification of the readers?
Appropriateness of model complexity	• Does the model incorporate the most important determinants of transmission and relevant data sources?
Suitability of mathematical modelling to explore the research question	• If not appropriate, what other methods should have been used for this effect?
Identification of data sources used as input in the models.	• Identification of different data sources used for the purpose of the model
Description and explanation of major model assumptions.	• Enumeration of assumptions made and impact of these in the findings of study (i.e. study limitations)
Factors explored through the model.	• Major parameters considered in the model (i.e. disease determinants, population characteristics, travel parameters)
Methodology used for model validation (if any).	• Were any model validation methods used by the authors and if so, which methods were applied.
Techniques used for model fitting.	• Model fitting methods applied by authors, if any.
Description and suitability of sensitivity analysis used (if any; if none were used, are there any explanations provided by authors).	• Was any sensitivity analysis performed? If not, what were the explanations provided by authors

Table S3- Characteristics of mathematical modelling and the time-series analysis studies (*n* = 20).

Studies	Influenza strain	Setting	Intervention	Time of implementation	Duration of intervention	Population/ Number of individuals under intervention	Countries/ (region/ city) involved	Years study conducted	Study design	Comparator used	Core outcomes
Bajardi, P., et al. (2011).	H1N1 pdm09	International level	Restrictions international air travel	Date of the travel restrictions, April 25, 2009 (day after the international alert)	pandemic influenza H1N1 period (2009-2010)	World population/ 3,362 subpopulations	220 countries (major transportation hubs across 220 countries)	2009	Mathematical stochastic model	Yes. Baseline: initial phase of the pandemic and international air travel restrictions of 6%	Delay epidemic spread (time)
Bolton, K. J., et al. (2012).	Pandemic influenza H1N1 pdm09	National	Restrictions internal travel (i.e. Road and rail)	After week 40 of the start of the pandemic	between 2 and 12 weeks	Mongolian population= 2,375,800. Per patch (14 patches)= 58,300-1,112,300	1 country (all)	2009-2010	Mathematical stochastic model	No.	Delay pandemic peak (time) Impact on magnitude of Influenza-Like Illness peak Impact on mean Attack Rate
Brownstein, J. S., et al. (2006).	Seasonal influenza	National & international (Europe)	Restrictions international and internal air travel (9/11 event)	Not specified	Influenza seasons (1996 to 2005)	USA population/ Centers for Disease Control and Prevention's mortality data 131 USA cities	1 country (131 USA cities)	1996 to 2005	Time-series analysis	Yes. Seasonal flu seasons between 1996 and 2005 without travel restrictions (excluding 2001-2002 flu season).	Delay peak mortality due to influenza (time) Duration influenza season (time)
Chong et Zee (2012)	H1N1 pdm09	International travel	Restrictions international air, sea and land travel	One day after first case in global pandemic.	pandemic influenza H1N1 period (2009-2010)	Travelling population arriving to Hong Kong from 44 countries via air, land and sea.	Hong Kong	2012	Mathematical stochastic model	Yes. Baseline: No interventions	Delay peak pandemic. Impact on cumulative incidence/ AR Impact on number of infected cases entering the territory
Ciofi degli Atti, M. L., et al. (2008).	H5N1	National level	International air travel	Starting from day 30 of the first world case.	Entire duration of the epidemic OR until two months after introduction of first case in Italy	Italian population/ 57 million (2001 census Italian population)	1 country (38 Italian international airports)	2008	Mathematical global determinist and stochastic individual models (based on Ravchev & Longini's model).	Yes. No interventions.	Delay peak epidemic (time) Cumulative Attack Rate Peak daily Attack Rate

Colizza, V., et al. (2007).	H5N1-like strain	International level	Restrictions international air travel	Not specified	Not specified	World population/ Not specified	220 countries (3,100 airports in 220 countries accounting for 99% international air travel)	2007	Mathematical meta-population stochastic model (based on Ravchev & Longini's model).	Yes. Baseline: no interventions with four hypothetical R_0s (1.1, 1.5, 1.9 and 2.3)	Delay peak epidemic (time) Impact on Attack Rate
Cooper, B. S., et al. (2006).	Epidemic and pandemic influenza (not specified)	International level	International air travel	After 100 cases in each city (or 1,000 cases for Hong Kong, the city of origin)	Not specified.	World population (city level)/ Not specified.	Several countries (105 cities across the world)	2006	Mathematical metapopulation stochastic model (based on Ravchev & Longini's model).	Yes. No interventions.	Delay in epidemic peak (time)
Eichner, M., et al. (2009)	H1N1 pdm09	National level	International air and sea travel restrictions	Not specified	Not specified	Travellers to PICTs/ 3,453,868 annual travellers	Pacific islands and territories (17 PICTs)	2009	Mathematical stochastic model	No.	Impact on probability of introduction epidemic
Epstein, J. M., et al. (2007).	Pandemic influenza strain (H5N1-like strain)	National and international levels	International air travel restrictions	Sequential restrictions are applied to travel to and from a city that has crossed the threshold of 1,000 cumulative infectious cases.	After 12 months or until the end of the pandemic.	US & world populations/ 620,000,000 individuals	Several countries/ 155 cities (including the 100 busiest airports and 100 largest cities)	2007	Mathematical stochastic model of global influenza (based on Rvachev and Longini's model)	Yes. No interventions.	Mean delay spread epidemic (time) Impact on the mean number of cases (worldwide)
Ferguson, N. M., et al. (2006).	Pandemic influenza (novel strain)	National	Restrictions internal air travel restrictions and border restrictions (no entry of infected travellers from abroad)	Two weeks within the occurrence of 1st case (US only)/ From day 30 of the global pandemic onwards or after 50 cases have been reported in the country (GB & USA).	Duration of epidemic	GB & USA/ USA (excludes Hawaii & Alaska)= 300 million. GB= 58.1 million.	2 countries (all)	2006	Mathematical stochastic model	Yes. No interventions.	Delay epidemic spread (time) Delay epidemic peak (time) Delay introduction epidemic (time) Impact on overall Attack Rate
Flahault, A., et al. (2006).	Pandemic influenza (similar to 1968–1969 Hong Kong strain)	International level	International air travel restrictions	At the start of the pandemic, from a given date, or city-by-city when the number of infectious cases exceeds a predefined epidemic threshold (1/100,000).	Not specified	World population/ Not specified	Several countries (52 cities across the world)	2006	Deterministic model (based on Rvachev and Longini's model)	Yes. No interventions.	Delay epidemic spread (time)
Germann, T. C., et al. (2006).	Pandemic H5N1 influenza	National and community levels.	Restrictions internal air travel	When cumulative number of 10,000 symptomatic individuals nationwide is notified.	180 days (estimated duration influenza season)	USA population/ 281 million individuals (estimated population)	1 country (all regions- 14 major international airports in the US)	2006	Mathematical stochastic model	No	Delay epidemic peak (time) Impact on Cumulative Incidence
Hsieh, Y. H., et	Seasonal	Patch level	Restrictions	Not specified	Not specified	China population/	1 country (*n*	2007	Mathematical	No	Impact on

al. (2007).	influenza		internal travel			Not specified	patches)		stochastic model (multi-patch model)		transmissibility (R_0) Impact on spread of epidemic
Hollingsworth, T. D., et al. (2006).	Pandemic influenza	National & international levels	impact of international air travel restrictions	20 days after start of epidemic.	Not specified	World population/ Not specified	100 countries, plus source country (not specified)	2006	Mathematical stochastic model	No.	Delay export cases (time)
Kerneis, S., et al. (2008).	Pandemic influenza strain (not specified)	International level	International travel restrictions	Different times of implementation considered but not specified	Not specified	World population (city level)/ Not specified	Several countries (52 cities)	2008	Mathematical meta-population deterministic model (based on Ravchev & Longini, 1984)	No	Impact on the global burden of influenza
Lam, E. H., et al. (2011).	H1N1	National level (Hong Kong)	International age specific air travel restrictions	Beginning of pandemic (not specified).	During 50 days after start of pandemic	Hong Kong population/ Not specified	1 country (1 territory- Hong Kong)	2008	Mathematical deterministic and stochastic models	Yes. No interventions.	Delay arrival pandemic (time) Impact on the probability of an outbreak
Lee, J. M., et al. (2012).	H5N1	City and national levels	Reduction of migration within the country	Not specified	Not specified	South Korean population/ Not specified	1 country (16 South Korean cities- 7 metro cities, 9 provinces)	2011	Mathematical stochastic model	Yes. No intervention used as baseline.	Impact delay epidemic peak (time) Impact on magnitude of epidemic peak
Marcelino, J. and M. Kaiser (2012).	H1N1	International level	Restrictions specific international network flights & airport closures	Not specified	1 year	World population/ Not specified	Several countries (Cities spread worldwide where 500 major airports are located)	2007	Mathematical meta-population stochastic model	Yes. Airport closures	Impact on number of infected travellers into a given country.
Scalia Tomba, G. and J. Wallinga (2008).	Pandemic influenza strain (not specified)	International level	International travel restrictions	Not specified	Not specified	World population/ Not specified	Several countries (not specified)	2008	Mathematical model (Poisson regression)	No	Average delay spread epidemics (time)
Wood, J. G., et al. (2007).	Pandemic influenza (no particular strain specified)	City level (community).	Restrictions internal air travel (2-city routes only)	At 2 and 4 weeks of epidemic	Not specified	Australian cities populations/ Sydney (4.2 million), Melbourne (3.6 million), Darwin (110,000) (Australia Bureau of Statistics)	1 country (3 cities)	2007	Mathematical stochastic model	Yes. Baseline scenario: H5N1 strain with low transmissibility R_0=1.1-1.4.	Median delay spread epidemic (time)