

SUPPLEMENTARY MATERIAL

Supplementary Table 1: Search strategy

Database	Strategy	No. of publications
Medline (via PubMed)	<p><i>#1 Herpes Zoster</i></p> <p>“Herpes Zoster”[Mesh] OR zoster[tiab] OR shingle*[ti,ab]</p> <p><i>#2 Incidence</i></p> <p>“Incidence”[Mesh] OR inciden*[ti,ab]</p> <p>Limits Publication date from 01-01-2002.</p>	1,349
Embase	<p><i>#1 Herpes Zoster</i></p> <p>‘Herpes Zoster’/exp OR zoster:ti,ab OR shingle*:ti,ab</p> <p><i>#2 Incidence</i></p> <p>‘incidence’/exp OR inciden*:ti,ab</p> <p>Limits Publication date from 01-01-2002.</p> <p>Publication type: article, article in press, review (this is applied in Embase to avoid a lot of articles of non-pertinent type, such as conference abstracts)</p>	2,128
VHL	<p><i>#1 Herpes Zoster</i></p> <p>(mh:(herpes zoster)) OR (ti:(zoster)) OR (ab:(zoster)) OR (ti:(shingle*)) OR (ab:(shingle*))</p> <p><i>#2 Incidence</i></p> <p>(mh:(incidence)) OR (ti:(inciden*)) OR (ab:(inciden*))</p> <p>Limits Publication date from 01-01-2002.</p>	1,371

Supplementary Table 2: Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Population	<ul style="list-style-type: none"> • Studies in persons ≥ 50 YOA 	<ul style="list-style-type: none"> • All other age groups • Non-representative population (e.g. military personnel)
Intervention	<ul style="list-style-type: none"> • Not limited by intervention 	<ul style="list-style-type: none"> • NA
Comparator	<ul style="list-style-type: none"> • Not limited by comparator 	<ul style="list-style-type: none"> • NA
Outcome	<ul style="list-style-type: none"> • Incidence of HZ 	<ul style="list-style-type: none"> • HZ incidence in patients with another condition (e.g. immunocompromised persons). In case a study compared the incidence in a population with and without a certain condition, the full-text was checked to see whether an overall incidence could be calculated for both groups combined. • All other topics besides incidence
Study design	<ul style="list-style-type: none"> • Primary peer-reviewed research <ul style="list-style-type: none"> ○ Observational studies (e.g. cohort studies, case-control studies, pre-/post-vaccine introduction time series) ○ Surveillance studies 	<ul style="list-style-type: none"> • Non-primary research <ul style="list-style-type: none"> ○ Systematic reviews* ○ Meta-analyses* ○ Narrative reviews (without methods) ○ Public health programs or recommendations ○ Transmission modeling studies ○ Cost-effectiveness or health economics studies • Case reports • Letter to editor

		<ul style="list-style-type: none"> • Newspaper • Editorial • Comment • Opinion paper • Phase II/III trials • Molecular studies • Studies with insufficient methodological details
Limits		
Publication date	January 2002 – December 2018	Articles published outside of dates considered eligible for inclusion
Geographic scope	Worldwide	None
Language	English, German, Dutch, French, Spanish and Italian	Articles published in any other language besides those considered eligible for inclusion

HZ, herpes zoster; NA, not applicable; YOA, years of age.

*References of included articles in these systematic reviews/meta-analyses were manually screened for additional relevant original articles (as deemed necessary by the reviewer).

Supplementary Table 3: Quality assessment tool

Q1. Are the individuals captured in the study setting likely to be representative of the target population?

- *Yes: Study is representative of a broad population (e.g. regional vs. country level, age groups, health care setting, socio-demographic status).*

Representative healthcare setting:

- *General practice-based records*
- *Health insurance database*

- *No: Study sample is not representative of a broad population. No representative healthcare setting:*

- *Hospital-based records*
- *Population-based screening*
- *Pharmacy database*
- *Reports from clinical practice (this is when they just report what they think they remember seeing but do not get all cases from general practice-based records)*

Q2. Is there a valid case definition for the diagnosis of herpes zosterHZ patients?

- *Yes: A valid method was used to define a case of HZ within the study.*
- *ICD codes with chart/laboratory review confirmation*
 - *ICD codes only*
 - *Clinical diagnosis but with PCR confirmation*

➤ *No: Unclear or no valid method was used to define HZ.*

- *ICD codes AND antiviral prescriptions*
- *ICD codes OR antiviral prescriptions*
- *Antiviral prescriptions only*
- *Self-reported diagnosis*
- *Clinical diagnosis, without stating this comes from medical records*
- *No clear description of case definition*

Q3. Is the denominator properly defined to calculate HZ incidence?

- *Yes: Denominator to calculate HZ incidence (per person-time at risk or per study population at risk) calculated appropriately.*
- *No: Denominator either not clearly defined or calculated inaccurately.*

ICD, International Classification of Diseases; HZ, herpes zoster; PCR, polymerase chain reaction.

Supplementary Table 4: HZ incidence in the general population by age

Age group	Cumulative incidence (no. of HZ cases per 1,000 population) Range (no. of studies)	Incidence rate (no. of HZ cases per 1,000 person-years) Range (no. of studies)
≥45 years	2.54 (1 study) ⁶⁹	8.2 (1 study) ⁶²
45-54 years	2.36-6.56 (3 studies) ^{21, 26, 71}	3.6-4.44 (2 studies) ^{49, 78}
50-54 years	3.79-6.9 (6 studies) ^{30, 40, 43, 55, 70, 75}	2.5-6.2 (6 studies) ^{29, 36, 41, 68, 74, 76}
55-59 years	4.56-7.76 (6 studies) ^{30, 40, 43, 55, 70, 75}	3.2-7.46 (6 studies) ^{29, 36, 41, 68, 74, 76}
50-59 years	1.72-17.4 (15 studies) ^{26, 28, 31, 32, 47, 53, 58, 60, 63-66, 72, 73, 81}	2.44-6.07 (11 studies) ^{6, 15, 17, 18, 22-24, 42, 44, 46, 56}
≥60 years	6.18-16.21 (4 studies) ^{48, 58, 63, 73}	7.6-10.46 (2 studies) ^{17, 33}
45-64 years	1.15-7.42 (4 studies) ^{25, 34, 54, 69}	-
50-64 years	3.55-9.98 (2 studies) ^{19, 61}	-
55-64 years	4.09-8.29 (3 studies) ^{21, 26, 71}	5.8-7.48 (2 studies) ^{49, 78}
60-64 years	4.12-9.6 (8 studies) ^{19, 30, 40, 43, 52, 55, 70, 75}	3.9-9.71 (8 studies) ^{23, 29, 36, 41, 44, 68, 74, 76}
≥65 years	3.98-20.03 (9 studies) ^{14, 21, 25-27, 34, 50, 52, 69}	7.89-15.23 (6 studies) ^{15, 16, 20, 23, 37, 78}
65-69 years	6.1-10.85 (6 studies) ^{30, 40, 43, 55, 70, 75}	5.5-12.73 (9 studies) ^{16, 20, 29, 36, 37, 41, 68, 74, 76}
60-69 years	2.43-22.4 (15 studies) ^{26, 28, 31, 32, 47, 53, 58, 60, 63-66, 72, 73, 81}	4.62-9.41 (10 studies) ^{6, 15, 17, 18, 22, 24, 33, 42, 46, 56}
≥70 years	3.8-11.77 (5 studies) ^{26, 53, 60, 66, 79}	-
65-74 years	2.45-15 (5 studies) ^{14, 54, 61, 69, 71}	6.5-12.63 (3 studies) ^{44, 49, 78}
70-74 years	7.12-12.3 (6 studies) ^{30, 40, 43, 55, 70, 75}	6.34-14.2 (10 studies) ^{16, 20, 29, 33, 36, 37, 41, 68, 74, 76}
≥75 years	5.78-25 (4 studies) ^{14, 54, 55, 69}	9.1-12.97 (2 studies) ^{29, 49}
75-79 years	7.28-12.4 (5 studies) ^{30, 40, 43, 70, 75}	7.09-15.95 (9 studies) ^{16, 20, 33, 36, 37, 41, 68, 74, 76}
70-79 years	3.2-21.8 (13 studies) ^{28, 31, 32, 45, 47, 58, 60, 63-65, 72, 73, 81}	7.13-12.12 (9 studies) ^{6, 17, 18, 22, 24, 38, 42, 46, 56}
≥80 years	6.09-19.89 (11 studies) ^{28, 32, 40, 58, 60, 63-65, 72, 73, 81}	7.95-13.67 (13 studies) ^{6, 17, 18, 20, 22, 24, 41, 42, 46, 56, 59, 62, 76}
75-84 years	9.85-13.52 (2 studies) ^{61, 71}	9.9-11.45 (2 studies) ^{33, 78}
80-84 years	7.67 -12.65 (4 studies) ^{30, 43, 70, 75}	7.29-18.5 (5 studies) ^{16, 36, 37, 68, 74}
85-89 years	12.05-13.23 (2 studies) ^{30, 43}	9.0-18.4 (1 study) ⁷⁴
80-89 years	6.93-13.76 (2 studies) ^{31, 47}	9.9-12.8 (2 studies) ^{33, 74}
≥85 years	5.85-12.41 (3 studies) ^{61, 70, 75}	5.59-16.90 (5 studies) ^{16, 36, 37, 68, 78}
≥90 years	5.37-15.27 (4 studies) ^{30, 31, 43, 47}	6.8-12.9 (1 study) ⁷⁴
85-94 years	10.77 (1 study) ⁷¹	-
90-94 years	-	11.9 (1 study) ⁷⁴

≥95 years	9.45-14.37 (2 studies) ^{71, 77}	4.7 (1 study) ⁷⁴
Per year from 50 years until 94 years	2.15 (50 years) – 8.44 years (94 years) (1 study) ⁷⁷	-

HZ, herpes zoster

Supplementary Table 5: Quality assessment results (N=69)

Reference	Are the individuals captured in the study setting likely to be representative of the target population?	Is there a valid case definition for the diagnosis of herpes zoster patients?	Is the denominator properly defined to calculate HZ incidence?
Albrecht, 2015 ⁸⁰	No	Yes	Yes
Alicino, 2017 ⁶⁸	No	No	No
Amirthalingam, 2018 ³³	Yes	Yes	Yes
Brisson, 2003 ³⁴	No	No	Yes
Cebrian-Cuenca, 2010 ⁵³	No	No	Yes
Chao, 2011 ⁵⁸	Yes	Yes	Yes
Chaves, 2007 ¹⁴	No	No	Yes
Chen, 2014 ¹⁵	Yes	Yes	Yes
Di Legami, 2007 ⁶⁹	No	No	Yes
Edgar, 2007 ²⁷	No	Yes	Yes
Esteban-Vasallo, 2014 ⁵⁴	No	Yes	Yes
Fleming, 2004 ³⁵	No	No	Yes
Garcia-Cenoz, 2008 ⁵⁵	No	Yes	Yes
Gauthier, 2009 ³⁶	Yes	Yes	Yes
Gialloreti, 2010 ⁷⁰	No	Yes	Yes
Gonzalez Chiappe, 2010 ⁷¹	No	No	Yes
Hales, 2013 ¹⁶	Yes	Yes	Yes
Harpaz, 2018 ²⁶	Yes	Yes	Yes
Hillebrand, 2015 ³⁹	Yes	Yes	Yes
Imafuku, 2018 ⁴⁴	Yes	No	Yes
Insinga, 2005 ⁶	Yes	Yes	Yes
Jain, 2018 ³⁷	Yes	Yes	Yes

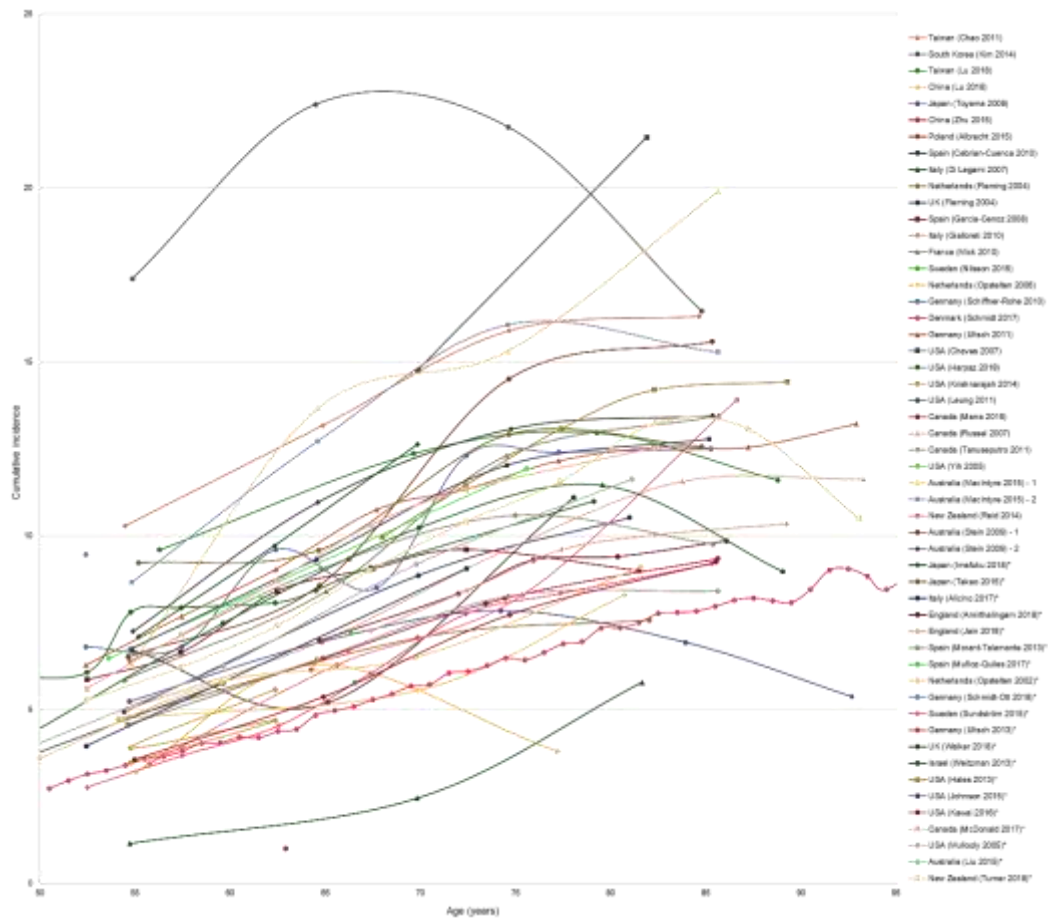
Jih, 2009 ⁵⁹	Yes	Yes	Yes
Johnson, 2015 ¹⁷	Yes	Yes	Yes
Kawai, 2016 ¹⁸	No	Yes	No
Kim, 2014 ⁸¹	Yes	Yes	Yes
Krishnarajah, 2014 ¹⁹	Yes	Yes	Yes
Langan, 2013 ²⁰	Yes	Yes*	Yes
Leung, 2011 ²¹	Yes	Yes	Yes
Li, 2016 ⁶⁵	No	No	No
Lin. 2010 ⁶⁰	Yes	Yes	Yes
Liu. 2015 ⁶²	No	No	Yes
Lu, 2018 ⁶¹	Yes	Yes	Yes
Lu, 2018 ⁶⁶	No	No	Yes
MacIntyre, 2015 ⁶³	Yes**	Yes**	Yes
MacIntyre-PBS 2015	No	No	Yes
Marra, 2016 ²⁸	No	Yes	Yes
McDonald, 2017 ²⁹	No	Yes	Yes
Mick, 2010 ⁷²	No	Yes	Yes
Morant-Talamante, 2013 ⁵⁶	No	Yes	Yes
Mullooly, 2005 ²²	No	Yes	No
Muñoz-Quiles, 2017 ⁵⁷	No	Yes	Yes
Nilsson, 2015 ⁷⁵	No	No	Yes
Opstelten, 2002 ⁴⁹	Yes	Yes	No
Opstelten, 2005 ⁵⁰	Yes	Yes	Yes
Opstelten, 2006 ⁵¹	Yes	Yes	Yes
Pierik, 2012 ⁵²	No	Yes	Yes
Reid, 2014 ⁷³	No	No	Yes
Rimseliene, 2016 ⁷⁹	Yes	Yes	Yes
Russel, 2007 ³¹	No	Yes	Yes

Russel, 2014 ³⁰	No	Yes	Yes
Schiffner-Rohe, 2010 ⁴⁰	No	Yes	Yes
Schmidt, 2017 ⁷⁷	No	No	Yes
Schmidt-Ott, 2018 ⁴¹	No	No	No
Shiraki, 2017 ⁴⁵	No	Yes	Yes
Stein, 2009 ⁶⁴	Yes	Yes	Yes
Stein-PBS 2009	No**	No**	Yes
Suaya, 2014 ²³	Yes	Yes	Yes
Sundström, 2015 ⁷⁶	No	Yes	No
Takao, 2015 ⁴⁶	No	Yes	Yes
Tanuseputro, 2011 ³²	No	Yes	Yes
Toyama, 2018 ⁴⁸	No	No	Yes
Toyama, 2009 ⁴⁷	No	No	Yes
Turner, 2018 ⁷⁴	No	No	No
Ultsch, 2011 ⁴³	Yes	Yes	Yes
Ultsch, 2013 ⁴²	No	Yes	Yes
Walker, 2018 ³⁸	Yes	Yes	Yes
Weitzman, 2013 ⁷⁸	Yes	Yes	No
Yawn, 2007 ²⁴	No	Yes	No
Yih, 2005 ²⁵	No	No	Yes
Zhu, 2015 ⁶⁷	No	No	No

* For the other case definition based on drug prescription, this entry was assigned as “No”.

** For the dataset (based on PBS), this entry was assigned as “No”.

Supplementary Figure 1: Cumulative HZ incidence from individual studies (N=69)



*Incidence rate (number of HZ cases per 1,000 person-years) converted to cumulative incidence (number of HZ cases per 1,000 population)
 HZ, herpes zoster