Prevalence of dementia in mainland China, Hong Kong, and Taiwan: an updated systematic review and meta-analysis

Supplementary material

S1. Protocol, search strategy, included and excluded studies

S2. Characteristics and quality of included studies (N=96)

S3. Estimation on number of people with dementia

S4. PRISMA checklist

Appendix S1. Protocol, search strategy, included and excluded studies

1. Systematic review protocol

Background

Dementia has become a major public health concern across the globe.[1] The worldwide epidemiology of dementia has been an important topic as it provides fundamental information for research and policy planning. Compared to other low and middle income countries, China has a comparatively rich body of literature on prevalence studies of dementia.[2] Although there are several existing systematic reviews of prevalence of dementia for mainland China, Hong Kong and Taiwan (latest search until April 2012),[2-4] the recent reporting of contemporary provides a need for these to be updated.

Aim

The aim of this study is to update the prevalence estimates of dementia in mainland China, Hong Kong and Taiwan and examine geographical variation and time trends incorporating the new studies. The objectives of this review include:

(1) To identify prevalence studies of dementia in mainland China, Hong Kong and Taiwan published after April 2012

(2) To estimate the prevalence and numbers of people with dementia using new dataset

(3) To examine variations across geographical areas and time periods with the adjustment for methodological factors

Method

Search Strategy

The same search strategy and inclusion/exclusion criteria reported in the earlier reviews will be used to select included studies.[4] An electronic search of English and Chinese databases: PubMed, Web of Science, Chinese

National Knowledge Infrastructure (CNKI), Wanfang and Airti Library will be conducted to identify publications on prevalence studies. The search strategy has been developed by leading authors of previous systematic reviews[2-4] and the reference lists of existing reviews[5-7] will be checked to identify unpublished studies or reports. The following table shows the English and Chinese search terms employed in the World Alzheimer Report 2015 (January 2011–March 2015) and the updated search (March 2015–February 2017):

The search strategy used in the World Alzheimer Report 2015

English keywords	Chinese keywords[1.]
Database: PubMed, Web of Knowledge	Database: CNKI, WanFang and Airti Library
Publication year: January 2011~March 2015	Publication year: January 2011~March 2015
Dementia OR Alzheimer*	癡呆、失智、阿爾茨海默
AND	
Prevalence OR Incidence[3] OR Epidemiology	患病率、盛行率、發生率、發病率、流行
AND	
China OR Chinese OR Taiwan OR Taiwanese	-[2]

The search strategy used in the updated review

English keywords	Chinese keywords[1.]
Database: PubMed, Web of Knowledge	Database: CNKI, WanFang and Airti Library
Publication year: March 2015~Feburary 2017	Publication year: March 2015~Feburary 2017
Dementia OR Alzheimer*	癡呆、失智、阿爾茨海默
AND	
Prevalence OR Epidemiology	患病率、盛行率、流行
AND	
China OR Chinese OR Taiwan OR Taiwanese	-[2]

[1.] Both traditional and simplified Chinese characters were used in the literature search.

[2.] These terms were not used in the search in Chinese databases.

[3.] Search terms further included ‘incidence’ for the collaboration of the World Alzheimer Report 2015

Title screening and full text review will be conducted by two reviewers based on the following inclusion and exclusion criteria:

Inclusion criteria

(1) Cases were collected by field survey, not based on hospital data

(2) The study involved population sampling rather than recruiting volunteer participants

(3) The study reported prevalence in the people aged 50 and over

(4) Dementia case identification was not solely decided by a screening test and that specific instruments and criteria were reported

Exclusion criteria

(1) Duplicate studies and follow-up studies of fixed population

(2) Irrelevant studies or with other focuses (such as Alzheimer's subtype or mild cognitive impairment)

(3) The results of follow-up waves

(4) The study population which investigated the prevalence of the Chinese population but outside of mainland China, Hong Kong and Taiwan

Data extraction

The following information will be extracted from the included studies:

(1) Study design: methods of screening, diagnosis and confirmation, interviewers and sampling method;

(2) Participants: sample size and response rate, characteristics of participants, such as age group, study location, urban or rural area;

(3) Dementia identification: screening tools, diagnostic criteria and instruments;

(4) Results: overall prevalence of all type dementia and stratified prevalence by age, gender and educational level.

Data analysis

The same analytical methods reported in the previous analysis[4] will be used to analyse the up to date prevalence data. To adjust for the effect of age, prevalence estimates from individual studies will be standardised to the

Census Population of China 2010.[8] A random-effect meta-analysis will be used to calculate the overall and regional pooled estimate of dementia prevalence. Meta-regression will be conducted to test whether the variation in prevalence estimates can be related to methodological factors or characteristics of study populations and to investigate difference across geographical areas and time periods taking into account study design and methodological factors. The results of meta-regression modelling will be applied to population structures by different areas and used to estimate the numbers of people with dementia.

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2. Included studies (new studies marked in red)

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3. Excluded studies

Duplicate

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Non population-based studies

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Focused on Alzheimer's disease or specific subtypes
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4. Included in the earlier review (Wu et al., 2013)

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Appendix S2. Characteristics and quality of included studies (N=96)

Study	Study area	Year of investigation	Age range	Study design	Sampling methods	Response rate	Sample size	Screening tool	Diagnostic criteria	Assessment tool for diagnosis
Ye, 2011 **[1]**	Zhejiang		60+	Two-stage	Cluster-based	95.1%	2445	BSSD, CSI-D	DSM-IV-R	Neuropsychological tests
Li, 2011 **[2]**	Anhui	2008	65+	Two-stage	Unknown	88.3%	1075	CSI-D, 10/66	CCMD-3	
Zhou, 2010 **[3]**	Shanghai	1997-1998	55+	Two-stage	Cluster-based	93.5%	15910	CMMSE	DSM-IV	ADL, POD, FOM, VFT, BD, DS, HAMD, HIS
Ji, 2010 **[4]**	Shanghai	2008	65+	Two-stage	Cluster-based		15158	MMSE, ADL	DSM-IV	
Wang, 2010 **[5]**	Shandong		60+	Two-stage	Individual-based		1500	MMSE	CCMD-3R, DSM-IV, ICD-10	ADL
Chen, 2009 **[6]**	Fujian	2006-2007	60+	Two-stage	Cluster-based	87.2%	2373	MMSE, CES-D	CCMD-3, DSM-IV	FOM, VFT, POD, WAIS, DS, CDT, medical history
Li, 2009 **[7]**	Fujian	2007	65+	Two-stage	Cluster-based	91.9%	2696	MMSE, ADL, CES-D	DSM-IV	HIS, FOM, POD, DS, RVR, WISC
Wang, 2009 **[8]**	Shandong	2008	60+	Two-stage	Cluster-based	96.7%	618	MMSE	DSM-IV	CT/MRI
Rodriguez, 2008 **[9]**	Beijing	1999	65+	One-stage	Cluster-based		2162		10/66 criteria	
Wei, 2008 **[10]**	Hebei	2006	60+	Two-stage	Individual-based		2308	MMSE, ADL	CCMD-2-R	
Yan, 2008 **[11]**	Beijing	2004	65+	Two-stage	Cluster-based	74.2%	1160	CSI-D, 10/66	ICD-10	
Huang, 2007 **[12]**	Guizhou	2005	60+	Two-stage	Cluster-based	81.5%	3229	MMSE, ADL	DSM-IV	HIS, FOM, POD, DS, RVR, CDT, medical history
Tan, 2007 **[13]**	Hubei	2007	55+	Two-stage	Cluster-based		3908	MMSE, ADL	DSM-III-R	HIS, FOM, POD, DS, RVR, BD, HAMD
Tang, 2007	Guangdong	2001-2002	55+	Two-stage	Individual-based	93.2%	5276	MMSE, ADL, CES-D	DSM-IV	HIS, FOM, POD, DS, RVR,

[14]										WISC, HAMD
Zhang, 2006	4 cities	1997-1998	55+	Two-stage	Cluster-based	94.4%	34807	CMMSE, ADL,	DSM-IV,	HIS, FOM, POD, DS, BD,
[15]								medical history	ICD-10	HAMD, VFT, CDT
Zhou, 2006	Henan		50+	Two-stage	Unknown	74.8%	16095	CMMSE, ADL,	DSM-IV	FOM, POD, DS, BD, CES-D,
[16]								medical history		Animal naming test, HIS
Tang, 2005	Sichuan	1997-1998	55+	Two-stage	Cluster-based	96.3%	5353	MMSE, ADL	DSM-III-R	HIS, FOM, POD, DS, RVR,
[17]										BD, HAMD
Tang, 2005	Sichuan	2000-2001	55+	Two-stage	Cluster-based	90.6%	3908	MMSE, ADL	DSM-III-R	HIS, FOM, POD, DS, RVR,
[17]										BD, HAMD
Wang, 2002	Guangdong		60+	Two-stage	Individual-based		1524	MMSE	DSM-IV	HIS, ADL, CT/MRI, medical
[18]										history
Tang, 2002	Beijing	1997	60+	Two-stage	Cluster-based	81.6%	2788	MMSE	DSM-IV	FOM, POD, DS, RVR, CDT,
[19]										VF, medical history
Shen, 2002	Shanghai	1998	60+	Two-stage	Cluster-based	89.7%	2038	MMSE	DSM-III-R	HIS, medical history
[20]										
Shen, 2002	Shanghai	1999	60+	Two-stage	Cluster-based	93.1%	2184	MMSE	DSM-III-R	HIS, medical history
[20]										
Shen, 2002	Shanghai	2000	60+	Two-stage	Cluster-based	95.1%	2237	MMSE	DSM-III-R	HIS, medical history
[20]										
Zhou, 2002	Chongqing	2001	65+	Two-stage	Cluster-based	87.4%	1519	MMSE, medical	DSM-IV	HIS, neuropsychological test,
[21]								history		medical history
Zhang, 2001	Beijing	1997-1998	55+	Two-stage	Cluster-based	96.1%	5743	MMSE, ADL	DSM-IV	HIS, FOM, POD, DS, RVR,
[22]										BD, HAMD, CDR, CDT
Qu, 2001	Shaanxi	1997-1998	55+	Two-stage	Cluster-based	93.9%	4850	MMSE, ADL	DSM-IV	HIS, FOM, POD, DS, RVR,
[23]										BD, HAMD,CT/MRI
Sun, 2001	Liaoning	1999	60+	Two-stage	Individual-based	100%	2000	MMSE, HDS	DSM-IV	HIS, CT/MRI
[24]										
Fei, 2001	Shanghai	1999	55+	Two-stage	Unknown	91.3%	462	MMSE	DSM-III-R	HIS, medical history
[25]										
Lai, 2000	Guangdong		70+	Two-stage	Individual-based	80.5%	3825	CMMSE, ADL, POD,	DSM-III-R	FOM, WAIS, DS, BD, Boston

[26]								BDS, VFT		name test, VFT
Wang, 2000 **[27]**	Beijing	1995	60+	Two-stage	Cluster-based	84.1%	5003	MMSE	DSM-III-R, ICD-10	HIS, Neurological examination
Zhang, 2000 **[28]**	Shanghai	1999	55+	Two-stage	Cluster-based	87.7%	1186	MMSE, ADL	DSM-III-R	FOM, POD, DS, RVR, BD
Fan, 2000 **[29]**	Jiangsu	1999	60+	Two-stage	Cluster-based		3268	MMSE, HDS	DSM-III-R	HIS, ADL, ROSEN
Li, 1999 **[30]**	Beijing	1997	60+	Two-stage	Cluster-based	93.5%	1593	MMSE, CRBRS, GDS	ICD-10	HIS, ADL, HAMD, DDDS
Li, 1999 **[31]**	Beijing	1994-1995	60+	Two-stage	Cluster-based	90.3%	1027	MMSE	DSM-III-R	HIS
Xiao, 1999 **[32]**	Hunan	1997-1998	55+	Two-stage	Cluster-based	87.8%	3287	MMSE	DSM-IV	HIS, ADL, FOM, POD, WAIS, RVR, medical history
Wang, 1999 **[33]**	Anhui	1998	65+	Two-stage	Cluster-based	92.0%	2749	HDS	CCMD-2-R, ICD-10	HIS
Tang, 1999 **[34]**	Sichuan	1994	65+	Two-stage	Cluster-based		5987	MMSE, HDS	DSM-III-R	HIS, SDSS
Chiu, 1998 **[35]**	Hong Kong	1995	70+	Two-stage	Individual-based	68.8%	1034	MMSE, GDS	DSM-IV	CT, physical examination, CAMDEX
Lou, 1998 **[36]**	Shanghai	1996-1997	50+	Two-stage	Cluster-based	88.2%	2316	MMSE	DSM-III-R	HIS
Lin, 1998 **[37]**	KaoKaoPing	1993	65+	Two-stage	Individual-based	72.6%	2915	MMSE, BDRS, CES-D, medical history	ICD-10	HIS, ADL, HAMD, CDR, CERAD, BDRS, mental activity
Yu, 1998 **[38]**	Guangdong	1995	65+	Two-stage	Individual-based	98.7%	1018	HDS	CCMD-2-R, ICD-10	HIS, GBS
Wang, 1998 **[39]**	Shandong	1998	60+	Two-stage	Unknown	89.8%	1448	MMSE	CCMD-2, DSM-III-R	HDS, ADL, medical history
Lv, 1998 **[40]**	Zhejiang	1995-1996	60+	Two-stage	Cluster-based	86.1%	1689	BSSD	RDCD	HIS, ADL, FOM, POD, DS, RVR, HAMD, medical history

Chen, 1998 **[41]**	Xinjiang	1995	50+	Two-stage	Cluster-based		2687	HDS	DSM-III	WAIS, CT
Liu, 1998 **[42]**	Kinmen	1993-1994	65+	One-stage	Cluster-based	84.5%	1736	Self-designed questionnaire, CDR, neuropsychological tests	DSM-III-R	HIS, CASI
Xue, 1997 **[43]**	Guangdong	1991-1993	60+	Two-stage	Individual-based	77.1%	3285	MMSE	DSM-III-R	HIS
Wu, 1996 **[44]**	Hainan		60+	Two-stage	Unknown		2528	MMSE	CCMD-2	
Zhang, 1996 **[45]**	Hainan	1992	55+	Two-stage	Cluster-based	95.0%	15164	CMMSE, Functional activity	DSM-III-R	HIS
Liu, 1996 **[46]**	Kaohsiung	1992	65+	Two-stage	Individual-based	84.7%	1016	CMMSE, BDS	DSM-III	HIS, HAMD, CDR, BDS, CERAD, neuropsychological test
Wang, 1995 **[47]**	Shanghai	1992	55+	Two-stage	Individual-based	83.4%	1515	CMMSE, BSSD	DSM-III	ADL, FOM, POD, DS, RVR, Medical history
Wen, 1995 **[48]**	Hainan	1995	55+	Two-stage	Unknown		5465	CMMSE	DSM-III-R	HIS
Gao, 1994 **[49]**	Hunan	1991	60+	Two-stage	Cluster-based	85.4%	5125	MMSE, CRBRS	DSM-III	HIS, HDS, DDDS
Mao, 1993 **[50]**	Fujian	1992	60+	Two-stage	Cluster-based	92.6%	1982	MMSE	DSM-III-R	
Gao, 1993 **[51]**	Shanghai, Jiangsu	1990	60+	Two-stage	Cluster-based	82.2%	3779	MMSE	DSM-III-R	HIS, medical history
Li, 1989 **[52]**	Beijing	1986	60+	Two-stage	Cluster-based	81.9%	1090	MMSE, CRBRS	DSM-III	GMS, DDDS
Zhang, 1989 **[53]**	Shanghai	1987	55+	Two-stage	Cluster-based	82.9%	5055	MMSE	DSM-III	ADL, FOM, POD, DS, RVR, BD, HDS, BDS
Gao, 1989	Beijing	1986	60+	Two-stage	Cluster-based	90.4%	906	CRBRS, neuro-system	DSM-III,	CT

[54]								test, self-designed questionnaire	ICD-9	
Chen, 2012	Anhui	2001-2003	65+	One-stage	Cluster-based	94.8%	2917		GMS-AGECAT	
[55]										
Fan, 2011	Shanxi	2008	60+	Two-stage	Cluster-based		1826	MMSE, ADL	DSM-IV	RVR, CDT, neuropsychological tests
[56]										
Kang, 2011	Hebei	2010	60+	Two-stage	Cluster-based	88.5%	3632	MMSE	DSM-IV	HIS, ADL
[57]										
Chen, 2012	4 province	2008-2009	65+	One-stage	Cluster-based	93.8%	3227		GMS-AGECAT	
[55]										
Chen, 1992	Beijing	1986	60+	Two-stage	Cluster-based	85.0%	5172	MMSE, CRBRS	DSM-III	GMS, DDDS, medical history
[58]										
Yip, 1992	Taipei	1990	65+	Two-stage	Individual-based	89.4%	1038	CMMSE, ADL	DSM-III-R	HIS, IADL, Memory and Behavior Problem Checklist, CMMSE, simplified high cortical function examination
[59]										
Lee, 1997	Ilan		65+	Two-stage	Cluster-based	92.2%	2717	CMMSE	DSM-III-R	Neuropsychological tests
[60]										
Yu, 1994	Shaanxi	1994	65+	Two-stage	Cluster-based	82.2%	2422	GHQ	DSM-III-R	HIS, MMSE, HDS-R, CT, Medical history
[61]										
Sun, 2012	Heilongjiang	2008-2009	60+	Two-stage	Cluster-based	92.8%	3698	CMMSE	DSM-IV	HIS, ADL, HAMD
[62]										
Pong, 2010	Gansu	2007-2008	65+	Two-stage	Individual-based	77.1%	569	MMSE, HDS	DSM-IV	
[63]										
Li, 2008	Hebei	2003	65+	Two-stage	Individual-based	98.5%	2126	MMSE, BSSD	DSM-IV	
[64]										
Yuan, 2005	Jiangxi	2002	60+	Two-stage	Cluster-based		2126	CRBRS, CIDI	CCMD-3, ICD-10	ADL, medical history, CIDI
[65]										
Liang, 2003	Guangdong	2002	60+	Two-stage	Cluster-based	89.6%	1418	MMSE	DSM-IV	HIS, ADL, FOM, HDS, DS, RVR, Medical history
[66]										

Wu, 2003 **[67]**	Hainan	2003	60+	Two-stage	Cluster-based		9770	MMSE	DSM-III-R	HIS
Tang, 1998 **[68]**	Beijing	1996	60+	Two-stage	Cluster-based	97.1%	501	MMSE, BDS, CES-D	DSM-III-R, ICD-10	CRBRS, CT
Chen, 2004 **[69]**	Hainan	2002	60+	Two-stage	Individual-based		12628	MMSE	DSM-III-R	HIS
Cheng, 1989 **[70]**	Shanghai		60+	Two-stage	Cluster-based	96.8%	1953	MMSE, HDS, SPMSQ	DSM-III	
Lai, 2011 **[71]**	Hainan	2010	55+	Two-stage	Cluster-based		7665	HDS	CDR	HIS
Liu, 1995 **[72]**	Taiwan	1994	60+	Two-stage	Cluster-based	82.6%	2288	MMSE	DSM-III-R	HIS, BDS
Ho, 2012 **[73]**	Jiangxi	2011	65+	Two-stage	Cluster-based	96.0%	1029	10/66 assessment tool	CCMD-3	
Sun, 2012 **[74]**	Shanghai	2010-2011	60+	Two-stage	Cluster-based	71.7%	1472	CMMSE	DSM-IV-TR	ADL, CSDD, CT/MRI
Ding, 2013 **[75]**	Shanghai	2010	60+	One-stage	Individual-based	69.5%	3141		DSM-IV	MMSE, CDR, ADL, CES-D, neuropsychological battery
Ma, 2013 **[76]**	Shanghai		65+	Two-stage	Individual-based	95.8%	2442	CMMSE, ADL	DSM-IV, ICD-10	FOM, POD, HDS, WAIS, HAMD
Wang, 2014 **[77]**	Guangdong	2011	60+	Two-stage	Cluster-based		2338	CMMSE, ADL	DSM-IV	
Wang, 2014 **[78]**	Zhejiang	2010	60+	Two-stage	Cluster-based	90.8%	1906	CMMSE	ICD-10	WAIS, medical history
Li, 2014 **[79]**	Zhejiang	2013	60+	Two-stage	Individual-based		2451	CMMSE, ADL	CCMD-2-R	
Mong, 2014 **[80]**	Xinjiang	2010-2012	55+	Two-stage	Individual-based	98.6%	3610	CMMSE, self-designed questionnaire	DSM	ADL, FOM, DS, RVR, CDR, CDT, CT/MRI
Tang, 2014	Hunan	2011-2012	55+	Two-stage	Cluster-based	99.4%	10026	MMSE, ADL	DSM-IV-TR	

[81]										
Li, 2015	Guangxi	2012-2014	60+	Two-stage	Unknown	79.4%	889	CMMSE	DSM-IV-TR	ADL, CDT, FOM, RVR, CT
[82]										
Jia, 2014	Five areas	2008-2009	65+	One-stage	Cluster-based	74.4%	10276		DSM-IV	HIS, FAQ, MoCA, MMSE,
[85]										CDR, medial history, CT/MRI
Sun, 2014	Taiwan	2008-2011	65+	One-stage	Individual-based	36.5%	10432		NIA-AA	CDR, TMSE
[83]										
Lam, 2006	Hong Kong	2005-2006	60+	Two-stage	Individual-based	88.5%	6100	CMMSE, AMIC	DSM-IV	
[86]										
Ji, 2015 **[84]**	Tianjin	2011-2012	60+	Two-stage	Cluster-based	97.1%	5578	CMMSE	DSM-IV	
Yang, 2016	Zhejiang	2014	65+	One-stage	Cluster-based	97.7%	2015		NIA-AA	CDR, MMSE
[90]										
Li, 2015	Tianjin		60+	Two-stage	Cluster-based		2532	MMSE, ADL	DSM-IV	HIS, HAMD
[91]										
Lou, 2016	Guangdong		60+	One-stage	Cluster-based		3224		ICD-10	CMMSE, ADL
[88]										
Zhang, 2015	Heilongjiang		60+	Two-stage	Cluster-based		2761	MMSE	DSM-IV	ADL
[89]										
Wang, 2016	Gansu	2014-2015	60+	Two-stage	Individual-based	99.4%	2416	HDS, GHQ	DSM-IV	CDR, HIS
[87]										
Gong, 2002	Hainan	2001	60+	Two-stage	Cluster-based	92.2%	2961	MMSE, CRBRS	CCMD-3-R	DDDS, HIS
[92]										

ADL: Activities of Daily Living; AMIC: Abbreviated Memory Inventory for Chinese; BD: Block design of Wechsler Intelligence Scale for Children; BDS: Blessed Dementia Scale; BSSD: Behavioral Syndromes Scale for Dementia; CASI: Cognitive Abilities Screening Instrument; CAMDEX: Cambridge Mental Disorders of the Elderly Examination; CCMD: Chinese classification of mental disorders; CDR: Clinical Dementia Rating; CDT: Clock Drawing Test; CERAD: Consortium to Establish a Registry for Alzheimer's Disease; CES-D: Center for Epidemiologic Studies Depression Scale; CIDI: Composite International Diagnostic Interview; CMMSE: Chinese Mini-Mental State Examination; CRBRS: Crichton Royal Behaviour Rating Scale; CSDD: Cornell scale for depression in dementia; CSI-D: Community Screening Instrument for Dementia; CT/MRI: Computed tomography or magnetic resonance imaging; DDDS: Dementia differential diagnostic schedule; DS: Digit Span test; DSM: Diagnostic and Statistical Manual of Mental Disorders; FAQ: Functional Activities Questionnaire; FOM: Fuld object-memory Evaluation; GBS: Gottfries ,Brane and Steen Scale; GDS:

Geriatric Depression Scale; GHQ: General Health Questionnaire; GMS: Geriatric Mental Status; HAMD: Hamilton Rating Scale for Depression; HDS: Hasegawa's Dementia Scale; HIS: Hachinski Ischemic Scale; ICD: The International Statistical Classification of Diseases and Related Health Problems; MoCA: Montreal Cognitive Assessment; NIA-AA: criteria of the National Institute on Aging-Alzheimer's Association; POD: Pfeiffer Outpatient Disability Questionnaire; RVR: Rapid Verbal Retrieve; SPMSQ: Pfeiffer's short portable mental status questionnaire; TMMSE: Taiwanese Mini-Mental State Examination; WAIS: Wechsler Adult Intelligence Scale

Study quality assessment

The quality of all included studies was assessed using the methods reported in the World Alzheimer Report.[1,2] A summarised score for study quality was calculated based on: (1) sample size: 0 point for 499 or below, 0.5 point for 500–1499, 1 point for 1500–2999 and 2 points for 3000 or above; (2) study design: 0 point for two-stage study without sampling of screen negatives, 1 point for two-stage study with sampling of screen negatives but no weighting back, 2 points for one-stage or two-stage study with appropriate sampling and weighting; (3) response rate: 0 point for unknown, 1 point for <60%, 2 points for 60–79%, 3 points for >80%; and (4) diagnostic assessment: 1 point each for multi-domain cognitive test battery, formal disability assessment, informant interview and clinical interview.

Results of study quality assessment are reported in Table S2-1. The mean score for study quality was 6.5 (Std.: 1.9) with a range between 2.5 and 10.0. Variation in prevalence estimates was not associated with study quality (meta-regression coefficient 0.00; 95% CI: -0.34, 0.33) and I-square remained to be high (98.3%) when adjusting for study quality. Scores for study quality did not change considerably over time. This indicates more recent studies did not show better quality of study methods compared to earlier studies.

Table S2-1: Results of study quality assessment

Item	N (%)
Sample size	
<500	1 (1.0)
500-1499	17 (17.7)
1500-2999	41 (42.7)
>3000	37 (38.5)
Study design	
One-stage	9 (9.4)
Two-stage	82 (85.4)
Multistage with false negative correction and weights	5 (5.2)
Response rate	
Unknown	21 (21.9)
<60%	1 (1.0)
60-79%	10 (10.4)
≥80%	64 (66.7)
Diagnostic assessment	
Multi-domain cognitive battery, informant interview, a formal assessment of disability and a clinical interview	9 (9.4)
Overall score	
Mean (std.)	6.5 (1.9)
Time periods	
Before 1990	7.2 (1.8)
1990-1994	6.6 (1.7)
1995-1999	6.6 (1.9)
2000-2004	6.2 (2.2)
2005-2009	6.4 (1.9)
2010-2015	6.4 (2.2)

References

1. Alzheimer's Disease International. *World Alzheimer Report 2015: the global impact of dementia: an analysis of prevalence, incidence, cost and trends*. London: Alzheimer's Disease International, 2015.

2. Prince M, Bryce R, Albanese E, Wimo A, Ribeiro W, Ferri CP. The global prevalence of dementia: a systematic review and metaanalysis. *Alzheimers Dement* 2013;**9**:63-75.

Appendix S3. Estimation on number of people with dementia

To estimate the number of population with dementia and take into account methodological factors and geographical variation, age-stratified prevalence was calculated based on the results of meta-regression modelling. Since the pooled estimates of crude prevalence by five-year age groups approximately followed the pattern of doubling every 5 years, it was assumed that:

(1) P= prevalence of dementia in people aged 60 or over; predicted estimates from meta-regression model adjusting for methodological factors, geographical areas and time periods

(2) $p_{1=}$prevalence of age 60-64

$p_{2=}$ prevalence of age 65-69

$p_{3=}$ prevalence of age 70-74

$p_{4=}$ prevalence of age 75-79

$p_{5=}$ prevalence of age 80-84

$p_{6=}$ prevalence of age 85-89

$p_{7=}$ prevalence of age 90 or over

(3) The pooled estimates for prevalence of dementia approximately doubled every 5 years:

$p_{2=}2p_1$; $p_{3=}4p_1$; $p_{4=}8p_1$; $p_{5=}16p_1$; $p_{6=}32p_1$; $p_{7=}64p_1$

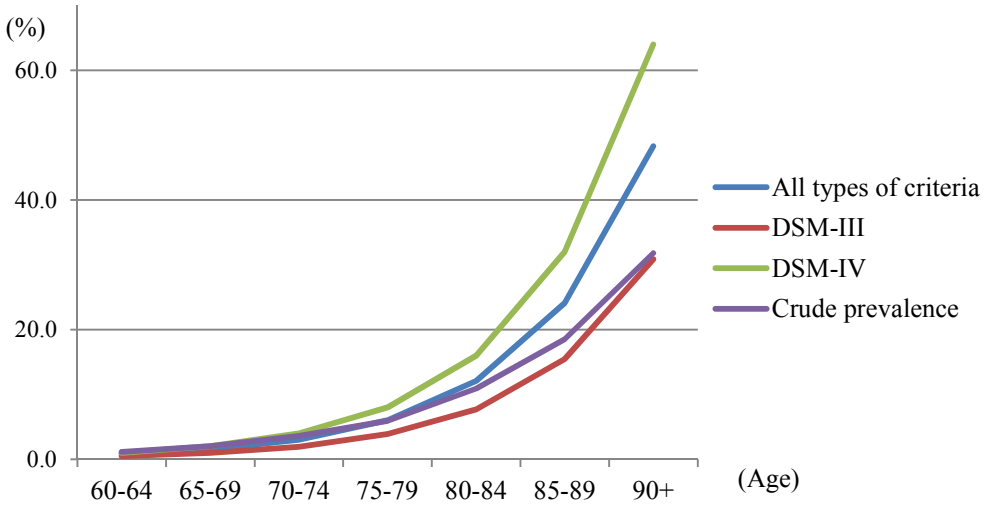
Based on (1)-(3), age-stratified prevalence of dementia can be calculated as

$p_{1=}\frac{P}{\sum_{i=1}^{7} 2^{(i-1)} \times r_i}$ where r_i= the proportion of the age group in the study population

$p_{2\sim7}$ can be calculated using p_1 and (3)

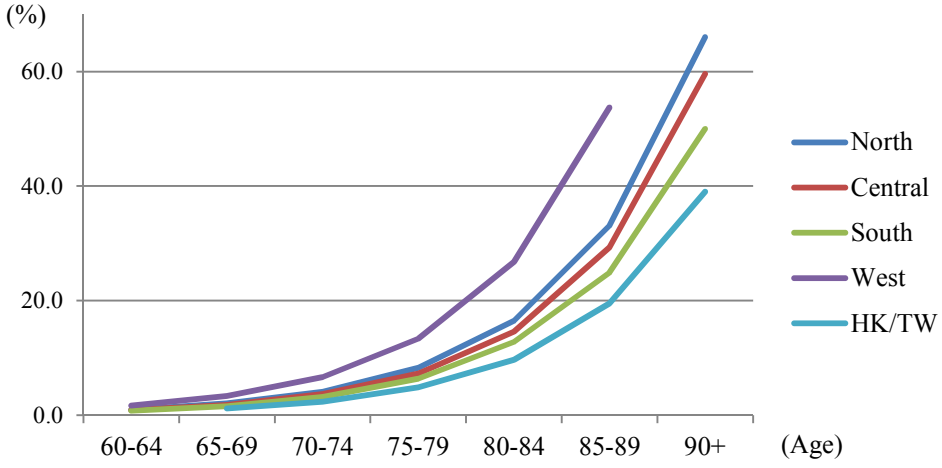
Figure S3-1 shows results of age-stratified prevalence estimates by different diagnostic criteria. Patterns of estimated and crude prevalence were generally similar across age groups.

Figure S3-1: Estimated and crude prevalence by age groups and diagnostic criteria



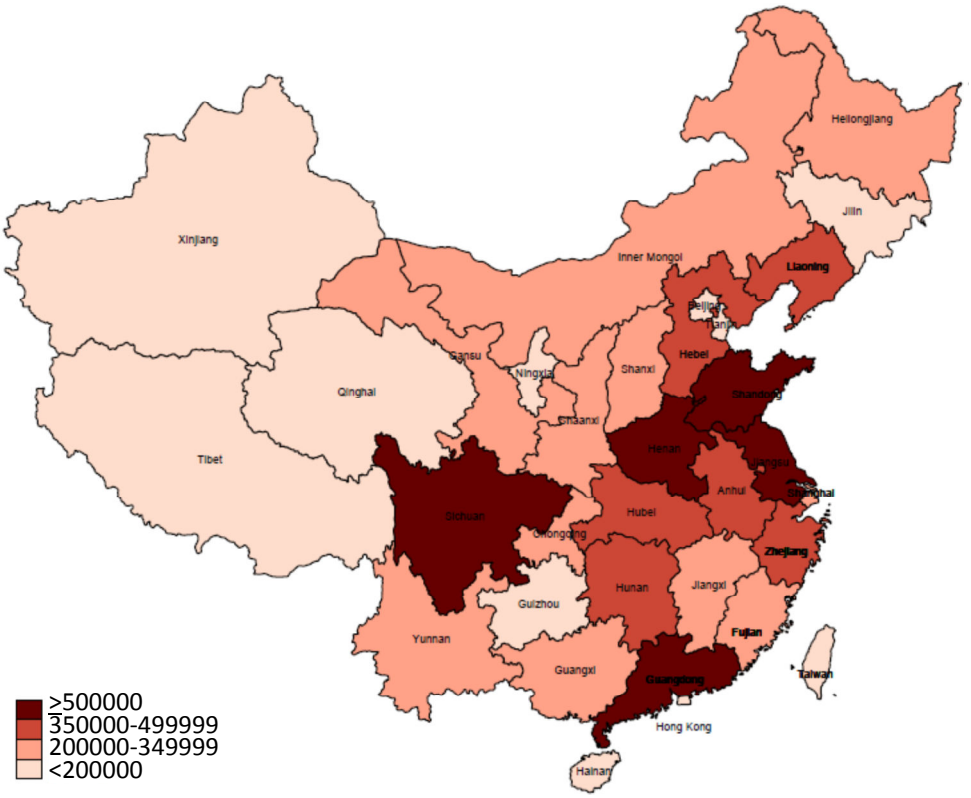
Regional prevalence in people aged 60 or above was estimated based on the results of meta-regression model including methodological factors, geographical areas and time periods. Since most studies in Hong Kong and Taiwan focused on the population aged 65 or above, the estimation was only generated from age 65. Since studies from western areas did not report prevalence estimate in age 90 or above, the estimate was calculated for age 85 or above. Using the same method, Figure S3-2 shows age-stratified prevalence across the five areas.

Figure S3-2: Estimated prevalence by five-year age groups and geographical areas



The five-year prevalence estimates were applied to population structures in provinces and cities of China, Hong Kong and Taiwan (Figure S3-3). Information on age structures was obtained from the National Bureau of Statistics for China, Department of Interior for Taiwan and Census and Statistics Department for Hong Kong Special Administrative regions (SAR).

Figure S3-3: Estimated number of people with dementia in the population aged 60 or above by provinces and cities in China and Taiwan



Appendix S4. PRISMA checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	p.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.	p.3-4
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	p.6-7
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	p.7
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.	N/A, systematic review protocol is provided in S1.
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.	p.8, S1

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.	p.8-9, Fig 1, S1
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Fig 1, S1
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).	p.8, Fig 1
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.	p.9
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	p.9-10
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.	p.9, S2
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	p.9
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.	p.10-11
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).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	p.11-12
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.	Fig 1, S1

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.	p.10-13, S2
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).	S2
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.	Fig 2
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	p.12-14
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	p.13-15
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).	p.15
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).	p.16-18
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	p.18-21
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.	p.22

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