Elder abuse prevalence in community settings: a systematic review and meta-analysis

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Summary

Background Elder abuse is recognised worldwide as a serious problem, yet quantitative syntheses of prevalence studies are rare. We aimed to quantify and understand prevalence variation at the global and regional levels.

Methods For this systematic review and meta-analysis, we searched 14 databases, including PubMed, PsycINFO, CINAHL, EMBASE, and MEDLINE, using a comprehensive search strategy to identify elder abuse prevalence studies in the community published from inception to June 26, 2015. Studies reporting estimates of past-year abuse prevalence in adults aged 60 years or older were included in the analyses. Subgroup analysis and meta-regression were used to explore heterogeneity, with study quality assessed with the risk of bias tool. The study protocol has been registered with PROSPERO, number CRD42015029197.

Findings Of the 38 544 studies initially identified, 52 were eligible for inclusion. These studies were geographically diverse (28 countries). The pooled prevalence rate for overall elder abuse was 15·7% (95% CI 12·8–19·3). The pooled prevalence estimate was 11·6% (8·1–16·3) for psychological abuse, 6·8% (5·0–9·2) for financial abuse, 4·2% (2·1–8·1) for neglect, 2·6% (1·6–4·4) for physical abuse, and 0·9% (0·6–1·4) for sexual abuse. Meta-analysis of studies that included overall abuse revealed heterogeneity. Significant associations were found between overall prevalence estimates and sample size, income classification, and method of data collection, but not with gender.

Interpretation Although robust prevalence studies are sparse in low-income and middle-income countries, elder abuse seems to affect one in six older adults worldwide, which is roughly 141 million people. Nonetheless, elder abuse is a neglected global public health priority, especially compared with other types of violence.

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Introduction

Elder abuse is a serious human rights violation that requires urgent action.[1] It is also a major public health problem that results in serious health consequences for the victims, including increased risk of morbidity, mortality, institutionalisation, and hospital admission, and has a negative effect on families and society at large.[2–4] Despite the severity of its consequences, major gaps remain in estimating the prevalence of elder abuse.

Understanding the magnitude of elder abuse is a crucial first step in the public health approach to prevent this type of violence.[5] However, the lack of consensus in defining and measuring elder abuse and its major subtypes (psychological, physical, sexual, and financial abuse and neglect) have resulted in wide variations in reported prevalence rates. For example, national estimates of past-year abuse prevalence rate ranged between 2·6% in the UK[6] and 4% in Canada[7] to 18·4% in Israel[8] and 29·3% in Spain.[9]

To date, only a handful of studies have synthesised results of elder abuse prevalence studies, and few have done so quantitatively. Cooper and colleagues'[10] global estimate is one in 17, or 6%, in the past month. This estimate was based on individual studies selected as best evidence. Dong's systematic review[11] ranged from 2·2% to 79·7% and covered five continents, with large geographic variations that might stem from cultural, social, or methodological differences. Given the large number of prevalence studies published over the past decade and the absence of global quantitative estimates of the prevalence of elder abuse, we believed it was an opportune time for a full systematic review and quantitative analysis of elder abuse prevalence.

To address the need for more accurate global and regional estimates of elder abuse prevalence, we did a systematic review and meta-analysis of existing elder abuse prevalence studies from around the world. We aimed to understand the wide variations in prevalence estimates by investigating the influence of studies' demographic and methodological characteristics.

Methods

Search strategy and selection criteria

In this systematic review and meta-analysis, we used a comprehensive four-step search strategy to identify relevant studies. No language restrictions were placed on the searches or search results. The study conforms to the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) guidelines. A detailed

Research in context

Evidence before this study

We did a thorough search of the scientific literature before initiating this study to detect any existing systematic reviews or prevalence studies; furthermore, we used the systematic review done for this study, as detailed above, to ensure that no studies had been missed. Although no meta-analyses existed before this study, one systematic review emerged in the scientific literature after the initiation of this study that found a global aggregate elder abuse prevalence rate of 14·3% (95% CI 7·6–21·1).

Added value of this study

Our study is the first of its kind to use meta-analysis to quantify prevalence estimates derived from a comprehensive search strategy that included additional search for studies that are not commonly found in academic sources.

Implications of all the available evidence

The dearth of elder abuse prevalence studies from low-income and middle-income countries and from southeast Asia and Africa, despite our comprehensive search strategy, suggests a need for further research to better understand elder abuse in these areas of the world. However, high rates of abuse globally suggest that increased attention to the issue of elder abuse is warranted, including investment in development and assessment of elder abuse interventions to help reduce the spread and effect of elder abuse.

Panel 1: Risk of Bias Tool: criteria for assessment of quality

External validity (maximum score=4)

1 Was the study's target population a close representation of the national population (subnational or city) in relation to relevant variables such as age, sex, occupation? (Yes: low risk=1 point; no: high risk=0 points)
2 Was the sampling frame a true or close representation of the target population? (Yes: low risk=1 point; no: high risk=0 points)
3 Was some form of random selection used to select the sample, or was a census undertaken? (Yes: low risk=1 point; no: high risk=0 points)
4 Was the likelihood of non-response bias minimal? (Yes: low risk=1 point; no: high risk=0 points)

Internal validity (maximum score=6)

1 Were data collected directly from the subjects (as opposed to a proxy)? (Yes: low risk=1 point; no: high risk=0 points)
2 Was an acceptable case definition used in the study? (Yes: low risk=1 point; no: high risk=0 points)
3 Was the study instrument that measured the parameter of interest shown to have reliability and validity (if necessary)? (Yes: low risk=1 point; no: high risk=0 points)
4 Was the same mode of data collection used for all subjects? (Yes: low risk=1 point; no: high risk=0 points)
5 Was the length of the shortest prevalence period for the parameter of interest appropriate? (Yes: low risk=1 point; no: high risk=0 points)
6 Were the numerator(s) and denominator(s) for the parameter of interest appropriate? (Yes: low risk=1 point; no: high risk=0 points)

description of the method has been previously reported and is available upon request.[12] The research is part of a larger systematic review; however, the present study focused on self-reported prevalence studies on elder abuse within community settings. Forthcoming publications will focus on prevalence of abuse in institutional settings as well as studies using service-based data.

First, we searched the following 14 academic databases from inception to June 26, 2015: PubMed, PsycINFO, CINAHL, EMBASE, MEDLINE, Sociological Abstracts, ERIC, AgeLine, Social Work Abstracts, International Bibliography of the Social Sciences, Social Services Abstracts, ProQuest Criminal Justice, ASSIA, Dissertations & Theses Full Text, and Dissertations & Theses Global. A search strategy was developed for each database with a combination of free text and controlled vocabulary (ie, MeSH terms). Additional search terms were included in consultation with an information specialist (librarian) who has extensive experience in systematic reviews. Some of the search terms include: "older adults", "frail elderly", "aged", "elderly", "seniors", "elder abuse", "elder neglect", "elder mistreatment", "elder maltreatment", "domestic violence", "intimate partner violence", "abuse", "violence", "aggression", "crimes", "harmful behaviour", "anger", "rape", "hostility", "conflict", "verbal abuse", "physical abuse", "sexual abuse", "emotional abuse", "prevalence", "incidence", "morbidity", and "epidemiology". See appendix for the full search strategy.

Second, reference lists of publications retrieved in the first step were screened for relevant studies. Third, we searched additional web-based platforms including specialised journals, Google searches for grey literature, and WHO Global Health Library for scientific literature published in developing countries. Finally, after all the screening and reviewing of studies had been completed, we consulted 26 experts in the field by email, representing each of the six WHO regions (ie, African, Americas, South-East Asia, Europen, Eastern Mediterranean, and Western Pacific) to provide further review to identify any studies that were missing up to Dec 18, 2015.

Articles were independently screened in two stages: screening of titles and abstracts followed by the retrieval and screening of full-text articles by two reviewers using

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the eligibility criteria described below. If several publications reported on a single study, the publication that provided the most data was selected for further synthesis. Inter-rater reliability was analysed using the Statistical Package for Social Sciences (SPPS Statistics 21). This analysis showed high levels of agreement between the reviews (κ 0·86–0·96). Disagreements were resolved through discussion, or with the help of a third reviewer.

Inclusion criteria were community-based samples that provided estimates of abuse prevalence at a national or subnational level (eg, states or provinces, counties, districts, and large cities [except in the USA, where states are the smallest unit, due to a large number of prevalence studies]) and inclusion of participants that were aged 60 years and older, in line with the UN definition of older people.[13] We excluded studies that were reviews, conference proceedings, or used qualitative methods only; studies that focused exclusively on self-neglect or homicide; and studies that concentrated only on institutional abuse or on specific subpopulations.

Data extraction and quality assessment

Data were extracted by two reviewers (YY, CRM): YY extracted data from the publications and CRM cross-checked for accuracy. Three main categories of data were extracted: characteristics of the samples, methodological characteristics of each study, and prevalence estimates of elder abuse and its subtypes. The data extraction tables were pilot tested and refined before extraction. The study quality was assessed as part of the data extraction strategy by two reviewers with the standardised Risk of Bias Tool (panel 1)[14] designed to assess population-based prevalence studies. To assess the risk of bias, reviewers rated each of the ten items into dichotomous ratings: low risk and high risk. An overall score was calculated by adding all the items rated as low risk. Thus, higher scores indicated lower risk of bias and stronger method quality.

Data analysis

Meta-analysis was done to synthesise the prevalence estimate for elder abuse and its subtypes. The decision to do a meta-analysis was made a posteriori to ensure that sufficient studies with similar characteristics (eg, same prevalence period population) were available for meta-analysis. Prevalence rates were calculated from raw proportions or percentages reported in the selected studies. The investigators were contacted for those studies in which raw data were missing or unclear. All analyses were done using Comprehensive Meta-Analysis software (CMA version 3.9).[15] Variances of raw proportions or percentages were pooled based on a random-effects model.[16] We calculated the pooled estimates and the 95% CIs in studies and considered non-overlapping CIs as an indication of statistically significant differences. To determine the extent of variation between the studies, we did heterogeneity tests with Higgins' I^2 statistic to measure the proportion of the observed variance that reflects true effect sizes.[16]

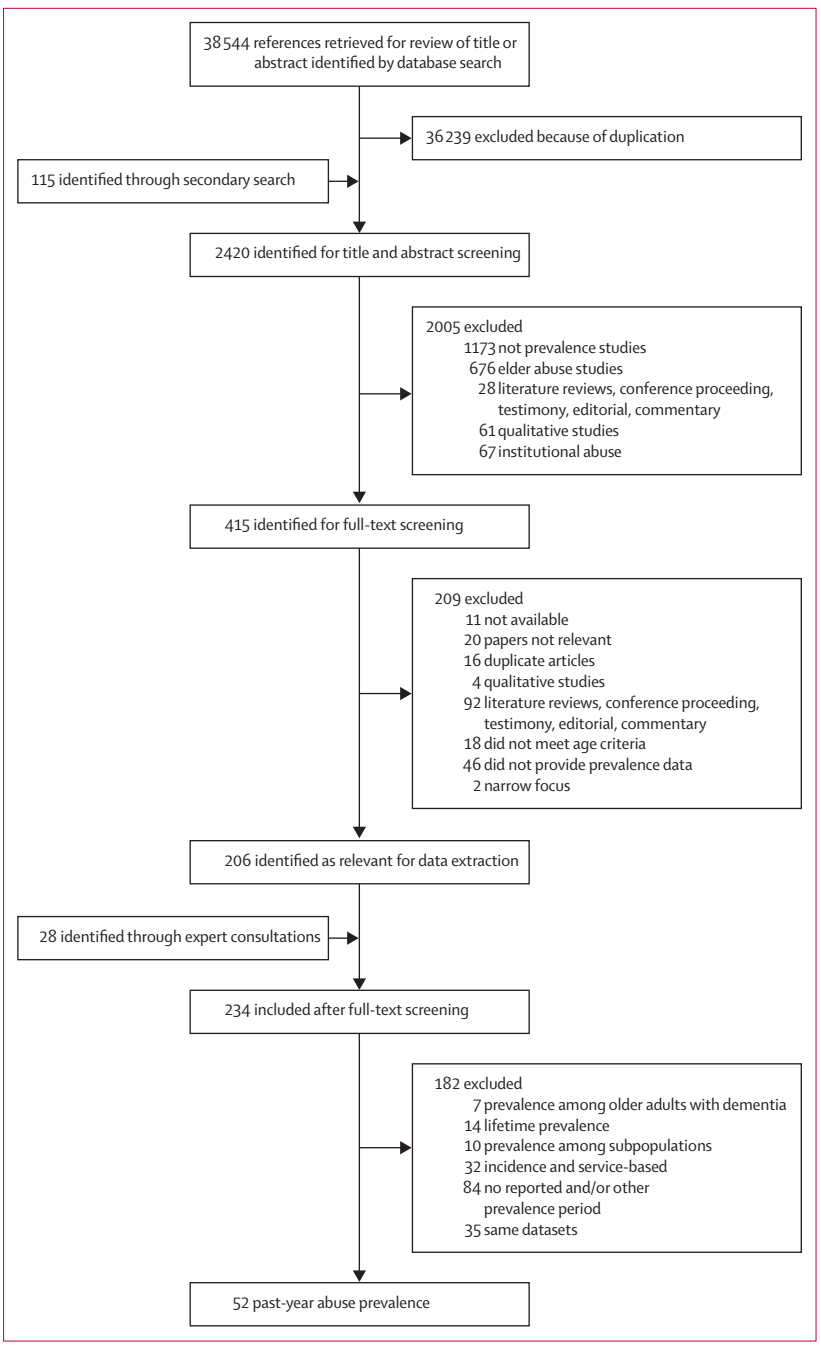

***Figure 1*: Flowchart of study selection**

We followed Duval and Tweedie's Trim and Fill method to visually inspect the funnel plots and assess both the degree of publication bias and its effect on the study findings.[16,17] We used their method of removing extreme outliers (ie, small studies) from the funnel plot and re-computing the effect size to correct for publication bias.[17]

Subgroup analyses were done to investigate the sources of heterogeneity, using bivariate comparisons and meta-

Panel 2: Key characteristics of participants and outcome measures of interest

Type of violence and definition

- Overall abuse (44 studies, 59 203 participants): "a single, or repeated act, or lack of appropriate action, occurring within any relationship where there is an expectation of trust which causes harm or distress to an older person".[1] Overall abuse might consist of any combination of abuse subtypes defined by the US Centers for Disease Control and Prevention,[18] below:
- Physical abuse (46 studies, 64 946 participants): when an older person is injured as a result of hitting, kicking, pushing, slapping, burning, or other show of force
- Sexual abuse (15 studies, 43 332 participants): involves forcing an older person to take part in a sexual act when the elder does not or cannot consent
- Psychological or emotional abuse (44 studies, 60 192 participants): behaviours that harm an older person's self-worth or wellbeing. Examples include name calling, scaring, embarrassing, destroying property, or not letting the elder see friends and family
- Financial abuse (40 studies, 45 915 participants): illegally misusing an older person's money, property, or assets
- Neglect (28 studies, 39 515 participants): failure to meet an older person's basic needs. These needs include food, housing, clothing, and medical care

regression. These analyses tested individual associations between the pooled estimates and several covariates: WHO regions (recoded as Americas, Asia, Europe, and others); income classification of each country (according to the World Bank classification, recoded into high *vs* middle-income and low-income countries); method of data collection (face-to-face *vs* all others); sampling procedure (random *vs* convenience sampling); research quality (recorded as good *vs* fair-to-poor); and sample size (coded as high, medium, and low tertiles, using the 33rd and 67th percentile scores). Significant and relevant covariates were entered into a multivariate meta-regression model. This study is registered with PROSPERO, number CRD42015029197.

Role of the funding source

The Social Sciences and Humanities Research Council of Canada (SSHRC) funded the corresponding author's time spent on this project and the WHO Department of Ageing and Life Course funded additional data extraction efforts. Neither the SSHRC nor the WHO Department of Ageing and Life Course had any role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

Of the 38 544 studies, 415 potentially relevant full-text articles were independently reviewed. From these, we identified 234 studies that provided data on abuse prevalence. Among these, seven studies examined elder abuse prevalence in people with dementia, 14 provided prevalence data for any abuse that had occurred since the victims became older adults (ie, aged 60 or 65 years and older), ten focused on subpopulations (eg, older women and ethnic minorities), 32 were incidence-based and service-based, 84 did not report the prevalence period or provided prevalence periods ranging from the past month to the past 5 years, and 35 were duplicates in that they used the same datasets as other studies (figure 1). To avoid bias in data synthesis, we grouped studies with the same prevalence period for meta-analysis. After excluding ineligible studies, 52 studies provided past-year prevalence data for abuse and were thus included in the meta-analysis. Panel 2 summarises the key outcome measures based on the definitions provided by WHO[1] and the US Centers for Disease Control and Prevention.[18]

The 52 studies selected for meta-analysis were geographically diverse and included 28 countries, with five studies from the WHO region of the western Pacific, five from the southeast Asia region, 15 from the region of the Americas, 25 from the European region, and two from the eastern Mediterranean region. Studies also came from countries across the World Bank income classification: five studies from lower-middle-income countries, 13 from upper-middle-income countries, and 34 from high-income countries. Moreover, 40 studies were based on random samples and the remaining 12 were convenience samples. Most studies (38) used face-to-face interviews to collect data, eight studies used self-administered questionnaires, and six used telephone interviews. The quality of each study was assessed. A maximum quality score of 10 was achieved in 16 of the 52 studies; 35 studies were scored as good quality and 17 studies were scored as fair-to-poor (table 1).

Prevalence rates for overall elder abuse were reported in 44 studies that included of 59 203 individuals. Overall elder abuse consisted of any combination of abuse subtypes as reported in the studies. The combined prevalence for overall abuse in the past year was 15·7% (95% CI 12·8–19·3; figure 2). Visual inspection of the funnel plot showed no evidence of publication bias (data not shown). The set of studies was heterogeneous for overall abuse ($Q[43]=4532·02$, $p<0·0001$), suggesting differences in the effect sizes exist within this set of studies. Higgins' I^2 showed that 99% of the variance comes from a source other than sampling error. The sources of the variation were investigated with bivariate analyses. Sample size was significantly associated with elder abuse prevalence (ie, high, medium, and low; $Q[2]=18·96$, $p<0·0001$). Two further covariates had p values below 0·10: income classification (ie, high-income and middle-income or

	Country	WHO region	Age (years)	Events	Total sample size	Event rate	Income classification	Method of data collection	Sampling procedure	Research quality
Podnieks, 1992	Canada	Region of the Americas	≥60	80	2008	4·0%	High income	Telephone interview	Random sampling	Good
Pitsiou-Darrough and Spinellis, 1995	Greece	European region	≥60	83	506	16·4%	High income	Face-to-face interview	Random sampling	Good
Comijs et al, 1998	Netherlands	European region	≥65	101	1797	5·6%	High income	Face-to-face interview	Random sampling	Good
Yan and Chang, 2001	Hong Kong, China	Western Pacific region	≥60	76	355	21·4%	High income	Self-administered	Convenience sampling	Fair-to-poor
Kim and Sung, 2001	South Korea	Western Pacific region	≥60	31	144	21·5%	High income	Telephone interview	Random sampling	Good
Chokkanathan and Lee, 2005	India	Southeast Asia region	≥65	56	400	14·0%	Lower middle income	Face-to-face interview	Random sampling	Good
Keskinoglu et al, 2007	Turkey	European region	≥65	N/A	N/A	N/A	Upper middle income	Face-to-face interview	Random sampling	Good
Ogioni et al, 2007	Italy	European region	≥65	462	4630	10·0%	High income	Face-to-face interview	Convenience sampling	Fair-to-poor
Gomez Ricardez et al, 2007	Mexico	Region of the Americas	≥60	87	1078	8·1%	Upper middle income	Self-administered	Random sampling	Fair-to-poor
Yaffe et al, 2007	Canada	Region of the Americas	≥65	113	858	13·2%	High income	Face-to-face interview	Convenience sampling	Fair-to-poor
Marmolejo, 2008	Spain	European region	≥65	19	2401	0·8%	High income	Face-to-face interview	Random sampling	Fair-to-poor
Lowenstein et al, 2009	Israel	European region	≥65	191	1045	18·3%	High income	Face-to-face interview	Random sampling	Good
Ajduković et al, 2009	Croatia	European region	≥65	188	303	62·0%	High income	Face-to-face interview	Convenience sampling	Fair-to-poor
Biggs et al, 2009	UK	European region	≥66	55	2111	2·6%	High income	Face-to-face interview	Random sampling	Good
Garre-Olmo et al, 2009	Spain	European region	≥75	197	672	29·3%	High income	Face-to-face interview	Random sampling	Good
Acierno et al, 2010	USA	Region of the Americas	≥60	659	5777	11·4%	High income	Telephone interview	Random sampling	Good
Apratto Júnior, 2010	Brazil	Region of the Americas	≥60	N/A	N/A	N/A	Upper middle income	Face-to-face interview	Convenience sampling	Fair-to-poor
Chompunud et al, 2010	Thailand	Southeast Asia region	≥60	34	233	14·6%	Upper middle income	Face-to-face interview	Convenience sampling	Good
Görgen et al, 2010	Germany	European region	≥60	773	3023	25·6%	High income	Face-to-face interview	Random sampling	Good
Su, Hao, Xiong, et al, 2011	China	Western Pacific region	≥60	281	975	28·8%	Upper middle income	Face-to-face interview	Convenience sampling	Fair-to-poor
Amstadter et al, 2011	USA	Region of the Americas	≥60	N/A	N/A	N/A	High income	Telephone interview	Random sampling	Good
Perez-Rojo et al, 2011	Spain	Region of the Americas	≥60	11	1207	0·9%	High income	Face-to-face interview	Random sampling	Good
Abdel Rahman and El Gaafary, 2012	Egypt	Eastern Mediterranean region	≥60	483	1106	43·7%	Lower middle income	Face-to-face interview	Convenience sampling	Good
Cevirme et al, 2012	Turkey	European region	≥60	129	452	28·5%	Upper middle income	Face-to-face interview	Convenience sampling	Fair-to-poor
Ergin et al, 2012	Turkey	European region	≥65	107	756	14·2%	Upper middle income	Face-to-face interview	Random sampling	Good
Olofsson et al, 2012	Sweden	European region	65–85	N/A	N/A	N/A	High income	Self-administered	Random sampling	Fair-to-poor
Wu et al, 2012	China	Western Pacific region	≥60	724	2000	36·2%	High income	Face-to-face interview	Random sampling	Good
Yan and Chan, 2012	Hong Kong	Western Pacific region	≥60	N/A	N/A	N/A	High income	Face-to-face interview	Random sampling	Good
Naughton et al, 2012	Ireland	European region	≥65	44	2021	2·2%	High income	Face-to-face interview	Random sampling	Good
HelpAge India, 2012	India	Southeast Asia region	≥60	1552	6748	23·0%	Lower middle income	Face-to-face interview	Random sampling	Fair-to-poor
Afifi et al, 2012	USA	Region of the Americas	≥65	N/A	N/A	N/A	High income	Face-to-face interview	Random sampling	Good
Giraldo-Rodriguez and Rosas-Carrasco, 2013	Mexico	Region of the Americas	≥60	63	613	10·3%	Upper middle income	Face-to-face interview	Random sampling	Good
Perez-Rojo et al, 2013	Spain	European region	≥60	41	340	12·1%	High income	Self-administered	Convenience sampling	Fair-to-poor
Alizadeh-Khoei et al, 2014	Iran	Eastern Mediterranean Region	≥60	44	300	14·7%	Upper middle income	Face-to-face interview	Random sampling	Good
Chokkanathan, 2014	India	Southeast Asia region	≥61	187	897	20·8%	Lower middle income	Face-to-face interview	Random sampling	Good
Cannell et al, 2014	USA	Region of the Americas	≥60	N/A	N/A	N/A	High income	Telephone interview	Random sampling	Good
Peterson et al, 2014	USA	Region of the Americas	≥60	N/A	N/A	N/A	High income	Telephone interview	Random sampling	Good
Préville et al, 2014	Canada	Region of the Americas	≥65	282	1765	16·0%	High income	Face-to-face interview	Convenience sampling	Fair-to-poor
Martins et al, 2014	Portugal	European region	≥65	32	135	23·7%	High income	Self-administered	Convenience sampling	Fair-to-poor

(Table 1 continues on next page)

	Country	WHO region	Age (years)	Events	Total sample size	Event rate	Income classification	Method of data collection	Sampling procedure	Research quality
(Continued from previous page)										
Peshevska et al, 2014	Macedonia	European region	≥65	307	960	32·0%	Upper middle income	Face-to-face interview	Random sampling	Good
Fraga et al, 2014—Germany	Germany	European region	≥60	197	648	30·4%	High income	Self-administered	Random sampling	Good
Fraga et al, 2014—Greece	Greece	European region	≥60	100	643	15·6%	High income	Face-to-face interview	Random sampling	Good
Fraga et al, 2014—Italy	Italy	European region	≥60	80	628	12·7%	High income	Face-to-face interview	Random sampling	Good
Fraga et al, 2014—Lithuania	Lithuania	European region	≥60	165	630	26·2%	High income	Face-to-face interview	Random sampling	Good
Fraga et al, 2014—Portugal	Portugal	European region	≥60	181	656	27·6%	High income	Face-to-face interview	Random sampling	Good
Fraga et al, 2014—Spain	Spain	European region	≥60	92	636	14·5%	High income	Face-to-face interview	Random sampling	Good
Fraga et al, 2014—Sweden	Sweden	European region	≥60	193	626	30·8%	High income	Self-administered	Random sampling	Good
Sooryanarayana et al, 2015	Malaysia	Southeast Asia region	≥60	28	291	9·6%	Upper middle income	Face-to-face interview	Convenience sampling	Fair-to-poor
Gil et al, 2015	Portugal	European region	≥60	138	1123	12·3%	High income	Face-to-face interview	Random sampling	Good
Silva-Fhon et al, 2015	Peru	Region of the Americas	≥65	294	369	79·7%	Lower middle income	Face-to-face interview	Random sampling	Fair-to-poor
Cano et al, 2015	Colombia	Region of the Americas	≥60	192	4248	4·5%	Upper middle income	Face-to-face interview	Random sampling	Fair-to-poor
Giraldo-Rodriguez et al, 2015	Mexico	Region of the Americas	≥60	350	1089	32·1%	Upper middle income	Self-administered	Random sampling	Good

Table 1: **Characteristics of prevalence studies included in meta-analysis for overall elder abuse**

low-income; Q[1]=3·66, p=0·0558) and method of data collection (ie, random sampling and convenience sampling; Q[1]=3·10, p=0·0784).

Sample size, income classification, and method of data collection were entered into the meta-regression, which yielded a significant model (F[4]=3·34, p=0·0191) that explained 26% of the variance. We found that when compared with studies with high sample size, studies with medium and low sample sizes had significantly higher prevalence estimates (7·2% *vs* 18·2%; T[36]=2·70, p=0·0101) and 18·1% (T[36]=2·51, p=0·0164). Studies using random sampling and those done in high-income countries had lower prevalence estimates in the meta-regression model, although differences for these variables were not independently statistically significant.

Of the 44 studies that reported overall abuse, 32 provided gender breakdown, with women representing 19756 of 34886 individuals. There was no gender difference in prevalence estimates (Q[1]=3·07, p=0·0799). Additional analyses were done to examine bivariate gender differences within several subgroups, revealing no significant differences. The global and WHO regional prevalence estimates for abuse in women and men are shown in figure 3.

Pooled prevalence estimates were determined for each of the abuse subtypes, with trim and fill adjustments done to account for missing studies because of publication bias. After adjustment, the prevalence estimate was 11·6% (95% CI 8·1–16·3) for psychological abuse, 6·8% (5·0–9·2) for financial abuse, 4·2% (2·1–8·1) for neglect, 2·6% (1·6–4·4) for physical abuse, and 0·9% (0·6–1·4) for sexual abuse (table 2).

Discussion

Using meta-analytical methods, we pooled the prevalence estimates of elder abuse reported in 52 publications published between 2002 and 2015. The global prevalence of elder abuse was 15·7%, or about one in six older adults. Given the approximate 2015 population estimates of 901 million people aged 60 years and older,[53] this rate amounts to 141 million victims of elder abuse annually. Prevalence estimates for abuse subtypes were highest for psychological abuse, followed by financial abuse, neglect, physical abuse, and sexual abuse. There was significant heterogeneity in the studies; 26% of the variance could be explained by sample size, income classification, and method of data collection. We found that studies with smaller sample sizes have higher prevalence estimates.

Few systematic reviews on the global prevalence of elder abuse exist, and none have used meta-analysis to synthesise global prevalence estimates. For the first time, this study provides methodologically rigorous global and regional estimates of elder abuse. Almost one in six older adults experienced abuse in the past year. This estimate is similar to the estimate from a recent systematic review by Pillemer and colleagues,[54] which found a global aggregate of 14·3% (95% CI 7·6–21·1). This figure was calculated based on 18 well conducted and large-scale population studies from 20 countries: 17 from high-income countries, two from upper-middle-income countries, and one from a lower-middle-income country. Our estimate of 15·7% was calculated based on 44 studies that came from a broad range of research quality and sample sizes. The convergence between these two global estimates, from two independently conducted systematic reviews, lends them credibility.

The present study also reveals considerable regional variations. Dong did a small-scale systematic review of prevalence studies and grouped estimates by continents,[11] including Asia with a range from 14% in India[23] to 36·2% in China,[30] Europe with a range from 2·2% in Ireland[39] to 61·1% in Croatia,[28] and the Americas with a range from 10% in the USA[52] to 79·7% in Peru.[45] Like Dong,[11] our findings provided insights into geographical differences in prevalence estimates, with Asia at 20·2%, Europe at 15·4%, and the Americas at 11·7%.

There are few analyses of how studies' characteristics influence abuse prevalence, and none in the area of elder abuse. Meta-analytical research on childhood sexual abuse suggested that studies using random sampling, compared with convenience sampling, as well as those with larger sample sizes, rather than smaller ones, were more likely to produce lower prevalence estimates.[55,56] The present study's meta-regression found that these two variables and income classification explained 26% of the variance in elder abuse prevalence. Large sample sizes, random sampling, and high-income countries were associated with lower prevalence estimates, although only sample size differences were independently statistically significant. As such, the methodological characteristics of this sample had effects in similar directions to those seen in published work on childhood sexual abuse.

Despite several additional analyses, our research found no significant difference in prevalence between older women and older men. Few studies have examined gender differences in elder abuse; those that did found mixed results, with some identifying disparate rates across genders.[57] Yet in studies of intimate partner violence, gender symmetry is reported, supported by both systematic review[58] and meta-analysis.[59] Although much research on abuse has used gender roles and masculinity as a predictor for violent behaviour, emerging evidence has shown a weak association between gender roles and abuse.[60] This evidence is further supported by similar rates of intimate partner violence emerging among same-sex and heterosexual couples.[60] However, most of this scientific literature comes from high-income countries and if more studies from low-income and middle-income countries were available, the finding of gender symmetry might not hold. Nonetheless, our findings contribute to this growing evidence for gender symmetry in abuse victimisation.

There are many strengths in this systematic review and meta-analysis. Our study is the first of its kind to use meta-analysis to quantify prevalence estimates derived from a comprehensive search strategy that included additional searches for studies that are not commonly found in academic sources. We also communicated with 26 experts to identify relevant articles. This study is also the first to include non-English language articles in a systematic review. We have extracted data from 47 non-English articles; the ten included in the analysis were written in Spanish, Portuguese, Chinese, German, and Farsi. Our study is the only study on elder abuse to explore the sources of heterogeneity. The wide confidence intervals found in our study as well as Pillemer and colleagues' study[54] show the importance of further research in this area to identify further sources of this large variance.

Our model (which included country income classification, whether the study used a random or convenience sample, and the size of the sample) left 74% of the variance unaccounted for. Factors that might explain this large proportion of variance, particularly between WHO regional estimates, might include country-specific or culture-specific social norms that govern family dynamics and expectations and methodological characteristics that we were unable to include. These methodological factors might include

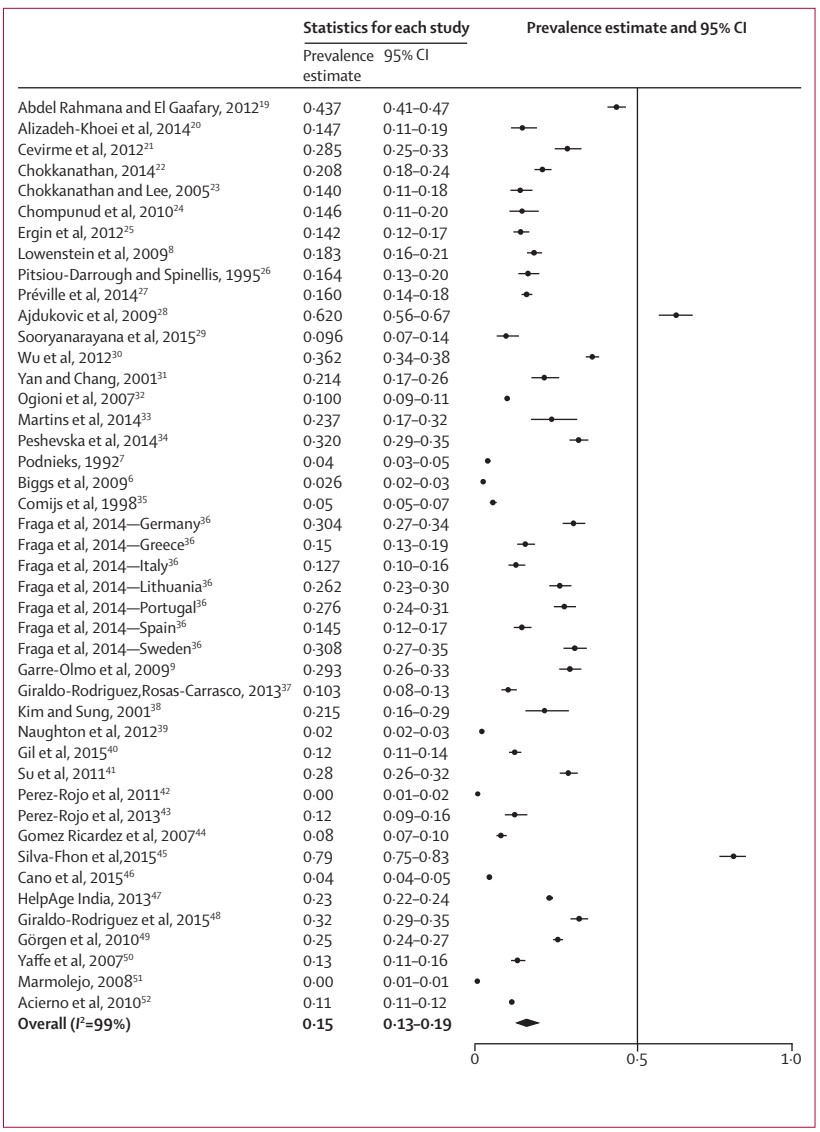

***Figure 2*: 1-year prevalence of elder abuse**

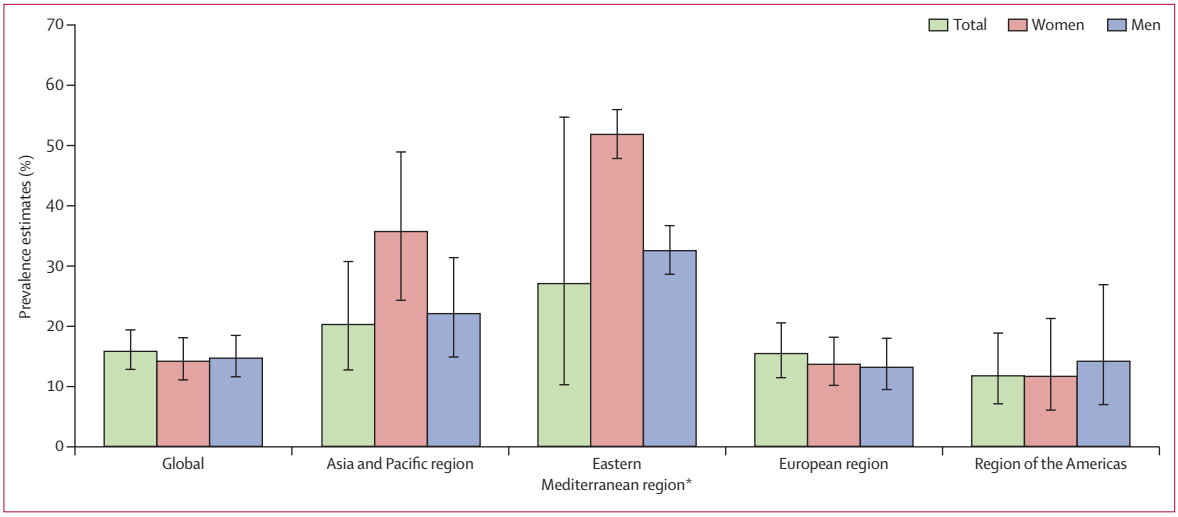

***Figure 3*: Estimated combined prevalence for elder abuse, separated by geographical area of the sample and gender**
Bars show 95% CI. *Less than two studies.

	Number of studies	Number of countries	Total sample	Pooled prevalence estimates	95% CI
Overall elder abuse	44	26	59 203	15·7%	12·8–19·3
Physical	46	25	64 946	2·6%	1·6–4·4
Sexual*	15	12	43 332	0·9%	0·6–1·4
Psychological	44	25	60 192	11·6%	8·1–16·3
Financial*	52	24	45 915	6·8%	5·0–9·2
Neglect*	30	20	39 515	4·2%	2·1–8·1

*Pooled estimates presented here were adjusted for publication bias.

***Table 2*: Prevalence of abuse and its subtypes**

varying definitions of elder abuse as well as the use of standardised or non-standardised instruments to assess and measure abuse.

Despite the strengths of our study, there are several limitations that can be addressed with future research. Although our comprehensive search strategy has identified many relevant studies, the majority of the studies included in the meta-analysis were from high-income countries. Prevalence studies are sparse or absent for many regions of the world, particularly in southeast Asia and Africa, which seem to have higher rates of abuse than developed countries.[11,31,61] More prevalence studies in low-income and middle-income countries are needed, particularly within these regions. These prevalence studies should use similar methods to allow for comparisons across countries.

Although many attempts have been made to contact the authors of selected studies, crucial data on definitions and measurements were still missing. This information is important for further methodological analyses that could examine how different definitions, measurements, and study periods affect prevalence estimates. For instance, although our findings are consistent with existing studies showing higher prevalence for psychological and financial abuse compared with other subtypes, there are challenges in defining and measuring psychological and financial abuse. Moreover, although our systematic review identified 234 studies on prevalence, the meta-analysis only focused on abuse occurring in the past year. It is possible that death of a victim can affect past-year prevalence; future research could compare and examine abuse estimates by using different study periods (eg, past month or lifetime), focusing on national or subnational studies, or examining prevalence variations within each WHO region. Additional research could explore the effect of country-specific or culture-specific social norms on prevalence estimates by including additional normative variables (eg, filial piety and existence of elder caregiving policies). The present study, focusing on older adults in general, found lower prevalence estimates than did studies that examined abuse in people in other age groups with disabilities.[62,63] Future research might also benefit from examining elder abuse prevalence in older adults with physical and cognitive disabilities, particularly given the widespread cognitive declines often seen in the oldest elders. Research in these areas would provide the basis to developing effective strategies to prevent and respond to abuse.

Elder abuse, despite affecting almost one in six (more than 140 million) older people, has not achieved the same public health priority as other forms of violence. None of the 169 targets of the UN's recently adopted 17 Sustainable Development Goals explicitly addresses violence against older people. By contrast, target 5.2 aims to eliminate all forms of violence against women and target 16.2 aims to end violence against children.[64] If the proportion of elder abuse victims remains constant, the number of victims will increase rapidly due to population ageing,[53] growing

to 330 million victims by 2050. The findings of this study strengthen the case for global action to expand efforts for preventing and supporting victims of abuse. Considering the serious health consequences, the health sector has an important role to prevent, raise awareness of, and provide evidence-based guidance for health-care practitioners to respond to elder abuse, particularly on psychological and financial abuse, which are more prevalent. Yet, few evidence-based interventions exist at present.[65–67] Investment in developing and assessing elder abuse interventions must be a public health priority to help to reduce the effect of elder abuse worldwide.

Contributors

YY, CRM, ZDG, and KHW designed the study. All authors oversaw its implementation. YY and CRM coordinated and did all review activities, including searches, study selection (including inclusion and exclusion of abstracts), data extraction, and quality assessment. YY, CRM, ZDG, and KHW planned the analyses and YY did the meta-analyses and meta-regressions. YY wrote the initial draft and YY, CRM, ZDG, and KHW contributed writing to subsequent versions of the manuscript. All authors reviewed the study findings and read and approved the final version before submission.

Declaration of interests

We declare no competing interests.

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