# Short-term Effect of Stock volatility and Cardiovascular Mortality: A systematic review and meta-analysis

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**Research article**

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# Abstract

INTRODUCTION: Cardiovascular diseases (CVD) and stroke are leading causes of death. It has several risk factors including stress and pressure. Stock volatility can cause acute stress for stock holders, so it can cause CVD events. Recently the spread of new coronaviruses worldwide has greatly affected economic development, leading to more severe stock market fluctuation, so we systematically quantify the short-term effect of stock volatility and CVD events.

METHODS AND MATERIALS: Time-series analysis on effect of stock volatility and cardiovascular events were included. We conducted systematic review and meta-analysis. 4 studies were included in the final analysis.

RESULTS: Every 100-point increase in the stock market will bring about 1.01% increases in the cardiovascular mortality (95% CI, -0.18% to 2.21%) The meta-analysis showed no statistical significance for cardiovascular mortality. In terms of stroke event, the estimate effect was 2.999% (95%CI, 0.325% to 5.673%). Different lag patterns also had effects on cardiovascular mortality. Every 100-point increase brought about 4.026% (95%CI, 1.516% to 6.536%) and 4.424% (95%CI, 1.145% to 7.703%) for lag 01 and 04 separately. Conclusions: Our study suggested that stock volatility had lag effect on CVD mortality. It may last for several days. Also, it might increase the incidence of stroke.


# 1. Introduction

Cardiovascular diseases (CVD) and stroke are leading causes of death. According to American Heart Association, CVD accounted for an estimated 31.5% [95% confidence intervals (CI), 30.3–32.9%] of all global deaths in 2013 in the world (1). With population growth and aging, the total number of CVD deaths had an increase of 41% from 1990 to 2013 (12.3 million to 17.3 million (2). From the statistics performed by WHO, the global cost of CVD was estimated at US $863 billion (3). Except for the well-established traditional risk factors, psychosocial factors and emotional stressors could also have a negative impact on cardiovascular health (4). So, it is easily understood that a large fluctuation of stock market and financial difficulties may bring substantial psychosocial stresses. Previously, stock volatility had been suggested as a potential risk factor of coronary heart disease (CHD) (5). Because it could cause acute stress. That is to say, stock volatility could adversely affect cardiovascular diseases. Moreover, the recent spread of new coronaviruses worldwide has greatly affected economic development, leading to more severe stock market fluctuation.

Few studies paid attention to the impact of unprecedented growth and collapse in the stock market on the health effect (5). Both linear and non-liner relationships had been reported. The non-liner relationship suggested that in a moderate range of fluctuation, the mortality rate stayed low, below or above which, the health outcome increased. However, not all of the studies discovered the positive relationship. Therefore, we conducted a systematic meta-analysis to investigate the association between stock volatility and the risk of cardiovascular mortality.

# 2. Methods And Materials

## 2.1. Search strategy and study criteria

We conducted a systematic literature search for studies published in PubMed, Embase and Cochrane Data up to the date 9 February, 2020. Key words related to exposure (stock volatility) and outcome (cardiovascular disease, mortality) were used. Mesh methods were used to ensure accuracy. For example, the search strategy for PubMed was ("stock volatility "[Mesh]) AND "mortality"[Mesh]). We also retrieved studies from the references in case that studies were not captured by the initial search.

We included time-series studies that reported cardiovascular mortality and all-cause mortality and other morbidity in response to stock market volatility. Commentaries, summaries, reviews, case reports, case series, editorials, letters were excluded. In case of the missing data- without relative risk (RR) or odds ratio (OR), we contacted the authors for additional information. If no further information were achieved, the study would be excluded.

## 2.2. Study selection

All titles and abstracts were merged into Endnote, duplicates were searched and removed. Then we screened all abstracts and titles separately (H.L. and X.D.) to delete the irrelevant citations. Full-texts of the potential eligible studies were read for inclusion. The two reviewers then compared the results. If different opinions appeared, the first step was discussing. If no agreement were reached after discussion, arbitration was sought from a third reviewer (X.W.).

## 2.3. Quality assessment

According to the Cochrane Handbook (6), and other related studies and articles (7, 8), we evaluated the study quality from the following aspects: study design, sample size, statistical analysis methods, stock market, adjusted confounders including meteorological factors, air pollutants, long-term trends, day of the week, and technique of disease diagnoses.

## 2.4. Data extraction and Publication bias

Authors (H.L. and X.D.) conducted data extraction independently. After discussion, we decided to use a standardized checklist to extract data from the selected studies. The items that we collected were: title, authors, year of publication, location and period, outcome, published journal, study design, statistical analysis model, number of events, variables controlled for, lag patterns and effect value. The effect value could be expressed in the form of odds ratio (OR), relative risk (RR), percent change, etc. The expression of stock volatility differed in the studies. Some used the percent change; others used 100-point change. Both were extracted. When data extraction was finished, we compared and cross-checked the extracted data, conflicts were adjudicated by Pro Wang. We tested publication bias using Egger's test.

## 2.5. Statistical analysis

The statistical analysis included 2 stages. In the first stage, we unified the independent variables into 1-percent change and 100-point change. We converted all effect estimates into RRs and got the percent change. At the second stage, a meta-analysis was used to pool the estimates of percent change from all the included cities. The analyses were conducted when the number of the study was no less than two. The main endpoints we focused on were cardiovascular mortality. As we pooled the city-specific estimates, if a city had no pooled result, we pooled the subgroup effect estimates before the final total analysis. In few analyses, different studies conducted in the same city, but focus on different diseases. Faced with this problem, we pooled the disease specific effect estimates first. Then we pooled city specific estimates as the results. Many studies provided different lag patterns of exposure to estimate the delayed effect, such as single-day lag and cumulative lags. The $I^2$ statistic was calculated to evaluate the city-specific estimates. Meta-analyses were fitted using a random effects model if $I^2$>25%. Otherwise, we chose the fixed effects model.

All the analyses were conducted by excel and Stata 16.0 (Stata Corp., College Station, Texas, USA).

# 3. Results

Finally, 79 articles were included in the initial search (Fig. 1). After reviewing titles and abstract, 71 were excluded because they were not qualified for the inclusion criteria. Of the remaining 8 articles, 2 were abandoned for no full text articles (9, 10), 2 were excluded for only found a positive relationship without an RR/OR (11, 12). After reviewing the full text articles, all the remaining 4 studies were included in the final analyses.

The characteristics of the included articles were listed in Table 1. Four articles included four places. These were Shanghai (5, 13), Guangdong, Taishan (14) in China and Singapore (15) in northeast Asia. Study periods varied from 2 to 12 years. All the studies were time-series designed. All the studies used generalized linear model (GLM) and one study applied distributed lag non-linear model (DLNM) (14). Shanghai Stock Exchange (5, 13), Shenzhen stock Exchange (14) and Singapore Stock Exchange (15) were used separately. Two ways were used to calculate the stock market changes, the absolute changes and relative changes. The studies explored different outcomes such as cardiovascular mortality (including stroke), admission for heart failure, stroke and myocardial infarction. Three of them explored different lag patterns. No obvious publication bias was found after Egger's test (P = 0.273).

The meta-analysis showed that no statistical significance between stock fluctuation and cardiovascular mortality. Every 100-point increase in the stock market will bring about 1.01% increases in the cardiovascular mortality (95% CI, -0.18–2.21%) (Fig. 2). In terms of stroke events, the estimate effect would be 2.999% (95%CI, 0.325–5.673%) (Fig. 3).

Different lag patterns also had effect on cardiovascular mortality. In the cumulative lag study, we found both lag01 (the moving average for the past 48 hours) and lag04 (the moving average for the past 120 hours) have significant effect. For lag01, every 100-point increase will bring about 4.026% (95%CI, 1.516–6.536%) increases in the cardiovascular mortality. For lag04, every 100-point increase will bring about 4.424% (95%CI, 1.145–7.703%) increases in the cardiovascular mortality. In single-day lag pattern, we found statistical significant in lag1 and lag3 (Table 2).

# 4. Discussion

To our best knowledge, this study is the first one ever to investigate the relationship between stock volatility and cardiovascular mortality. We came to the conclusion that stock fluctuation has significant and positive relationship with cardiovascular mortality, especially cumulative change. Stroke event could also be influenced. There were no publication biases. So the conclusion is reliable.

With the booming economy in early 2000s, many individuals began to invest in stock market worldwide. According to China Securities Depository and Clearing Corporation Statistical Yearbook 2018, the number of stock trading accounts jumped from 8.4 million in 1993 to 146.5 million in 2018, a 15-fold increase in 25 years (http://www.chinaclear.cn/zdjs/tjnb/center_datalist.shtml). After 2007, the extremely excellent year in the stock market, China attracted many new investors. Unfortunately, quite a number of investors were inexperienced and with unrealistic expectation. Moreover, many of them were elderly who have time to monitor the real-time performance of the stock market in the Stock Exchange hall (14). The sharp change in the stock market will bring emotional or physical stress.

In our study, a positive relationship was found between stock volatility and stroke events. According to the global burden of disease held in 2017, stroke was listed as the second leading cause of death and disability around the world (15). In 2017, there were 11.9 million incidences and 104.2 million prevalence. The unrealistic individual investors with high expectation could not adapt to the dramatic changes in the stock market, depression and stress would also push them to stroke (16, 17). As the number of studies is small, we cannot conduct sensitivity analysis. But previous studies concluded that stock index had stronger effects on male and elderly population, especially for those over the age of 65 (18). A loss impacted larger than a rise. This result is reasonable because first, age itself is a risk factor for stroke. Moreover, the elderly has more chronic diseases than the younger. If stock volatility does have great influence on stroke events, the elderly is most affected. Second, the elderly is always retired and have no income. If the stock market performs poorly, they may get more stress and depression, increasing the incidence of stroke (19). In terms of gender, it has been demonstrated that daily change effects are significant only for males. The potential reason is that men traded 45% more than women (12). Moreover, estrogen plays an important part in the vasoconstriction in both superficial and deep arteries, protecting females from cardiovascular diseases (20).

In our study, we concluded that both single and cumulate lag patterns affect CVD mortality. In terms of the effect value, lag04 had more effect than lag01 in the cumulative lag pattern. That is to say, the 120-hour moving average of stock market fluctuation influenced more than the 48-hour moving average. The timing of evaluating cardiovascular events after the stressor might be important, and varying results had been observed. For example, one of the researchers concluded that 10-day lag pattern had stronger correlation with increased cardiovascular mortality (12). Previous studies have demonstrated different lag patterns for different stress related mortality and morbidity (21). The short-term effect of Northridge earthquake last for 6 days. The Los Angeles Northridge earthquake limited the duration of increased cardiovascular deaths to a few days (22). However, influences about the Hanshin-Awaji earthquake and the Athens earthquake persisted for 1 month (23, 24). Moreover, research on cardiovascular hospital admissions after September 11 attacks showed no difference in a 1-week period after the attacks (25, 26). As different events have different lag patterns, more studies are needed to further understand the structure of the stock market volatility on cardiovascular health.

It has been estimated that psychological stress could sharply increase cardiovascular mortality and recurrent ongoing of major cardiovascular events, such as acute myocardial infarction (AMI) and stroke (16, 27). For example, after the US 911 terrorism attack, the CVD incidence rate increased by 53%, and lasted for about 3 years (28). The same phenomenon could be seen after Wenchuan earthquake in China, 2008 (29). The stock market all over the world underwent unprecedented fluctuation in recent years, which might lead to stress. Stress contributes not only to acute triggering of cardiac events, but also to the long-term development of coronary heart disease. Mechanisms such as sympathetic nervous system activation and increased abdominal fat deposition account for it (30). Sharp fluctuation might also lead to depression, which has been listed as one of the high risk factors for cardiovascular diseases (31, 32).

We found heterogeneity exists in our study. Heterogeneity came from inherent differences between the studies, as well as their design and statistical analysis. Except for the study areas and population, the outcome that we focused on might play an important role. Different regions had different economic characteristics, thus the impact of stock varied. Other factors, including study period might take part as well. Heterogeneity can also appear when research results depend not just on the quality of the research but also on the hypothesis tested, and the significance and direction of effects detected (33).

Notable points in this work must be considered. First, even if we took all the published work into our analysis, the limited number of studies and places stopped us from further analysis. Many of our sensitivity analysis only include 2 articles for the limited number of studies, which may not reflect the conditions of the whole population; we just want to get a trend out of this study and guide future research. Furthermore, more work should be conducted to confirm the susceptibility of the population. Second, some of the studies offer effect estimates not only from the absolute change of the stock market, but also the bidirectional change. They held the opinion that a rise in the stock market has a different effect on health than a fall. We did not take the latter one into consideration, because the design and statistical analysis vary widely from each other. As the number of studies increases, meta-analysis on bidirectional change may be conducted. Third, the limited number of published work also stopped us from further testing the publication bias, which came from the tendency on the parts of investigators, reviewers, and editors to submit or accept manuscripts for publication based on the direction or strength of the study findings (34). As more studies appear, new meta-analysis will solve the problem.

Our study provided further evidence that stock volatility might increase the CVD mortality in Shanghai, China. Shanghai is the economic center of China. The number of investors in Shanghai is 10 times the national average (http://www.chinaclear.cn/zdjs/tjnb/center_datalist.shtml). Maybe more attention to the stock market cause more stress and mood changes, which ultimately lead to changes in the number of illnesses. That may amlpify the estimate effect. Further studies should be taken in other places in China and other parts of the world.

# 5. Conclusion

Our study suggested that changes in the stock market have lag effect on CVD mortality. It may last for several days. Also, it may increase the incidence of stroke events. Although limited number of articles stopped us from further analysis, we want to remind investors to invest cautiously to avoid cardiovascular events caused by stress and pressure.

# 6. Abbreviations

CVD: Cardiovascular diseases; CI: confidence intervals; CHD: coronary heart disease; DLNM: distributed lag non-linear model; GLM: generalized linear model; OR: odds ratio; RR : relative risk.

# 7. Declarations

### Ethics approval and consent to participate

This meta-analysis does not need ethics approval.

### Consent for Publication

All the authors agree to publish the paper in BMC Complementary Medicine and Therapies.

### Availability of data and material

We will offer all the data if needed.


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### Competing interests

The authors declare no competing interests.

### Authors' Contributions

HL: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft

XD: Data curation, Investigation, Methodology, Writing – review & editing

HZ: Supervision, Writing – review & editing

XW: Conceptualization, Data curation, Methodology, Supervision, Writing – review & editing


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Not Applicable


# References


1. Truelsen T, Krarup LH, Iversen HK, Mensah GA, Feigin VL, Sposato LA, et al. Causes of Death Data in the Global Burden of Disease Estimates for Ischemic and Hemorrhagic Stroke. *NEUROEPIDEMIOLOGY* 2015; 45(3):152–160.
2. Roth GA, Forouzanfar MH, Moran AE, Barber R, Nguyen G, Feigin VL, et al. Demographic and epidemiologic drivers of global cardiovascular mortality. N Engl J Med. 2015;372(14):1333–41.
3. Mensah GA, Roth GA, Sampson UK, Moran AE, Feigin VL, Forouzanfar MH, et al. Mortality from cardiovascular diseases in sub-Saharan Africa, 1990–2013: a systematic analysis of data from the Global Burden of Disease Study 2013. CARDIOVASC J AFR. 2015;26(2 Suppl 1):6–10.

4. Ladwig KH, Lederbogen F, Albus C, Angermann C, Borggrefe M, Fischer D, et al. Position paper on the importance of psychosocial factors in cardiology: Update 2013. Ger Med Sci. 2014;12:c9.
5. Ma W, Chen H, Jiang L, Song G, Kan H. Stock volatility as a risk factor for coronary heart disease death. EUR HEART J. 2011;32(8):1006–11.
6. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. INT J SURG. 2010;8(5):336–41.
7. Chen ZB, Fan LB, Liu YJ, Zheng YR. Meta-Analysis of the Effects of Cardiac Rehabilitation on Exercise Tolerance and Cardiac Function in Heart Failure Patients Undergoing Cardiac Resynchronization Therapy. *BIOMED RES INT* 2019; 2019:3202838.
8. Tseng AS, Kunze KL, Lee JZ, Amin M, Neville MR, Almader-Douglas D, et al. Efficacy of Pharmacologic and Cardiac Implantable Electronic Device Therapies in Patients With Heart Failure and Reduced Ejection Fraction: A Systematic Review and Network Meta-Analysis. Circ Arrhythm Electrophysiol. 2019;12(6):e6951.
9. Song W, Ma W, Kan H. Stock Volatility and Deaths From Heart Disease and Stroke in a Chinese Population. *EPIDEMIOLOGY*; 22(1):S180.
10. Schwartz BG, Pezzullo JC, McDonald SA, Poole WK, Kloner RA. How the 2008 stock market crash and seasons affect total and cardiac deaths in Los Angeles County. AM J CARDIOL. 2012;109(10):1445–8.
11. Fiuzat M, Shaw LK, Thomas L, Felker GM, O'Connor CM. United States stock market performance and acute myocardial infarction rates in 2008–2009 (from the Duke Databank for Cardiovascular Disease). AM J CARDIOL. 2010;106(11):1545–9.
12. Chen CC, Chen CS, Liu TC, Lin YT. Stock or stroke? Stock market movement and stroke incidence in Taiwan. SOC SCI MED. 2012;75(11):1974–80.
13. Zhang Y, Wang X, Xu X, Chen R, Kan H. Stock volatility and stroke mortality in a Chinese population. J Cardiovasc Med (Hagerstown). 2013;14(9):617–21.
14. Lin H, Zhang Y, Xu Y, Liu T, Xiao J, Luo Y, et al. Large Daily Stock Variation Is Associated with Cardiovascular Mortality in Two Cities of Guangdong, China. PLOS ONE. 2013;8(7):e68417.
15. Yap J, Earnest A, Lee V, Sng G, Lam C, Yeo KK. Impact of stock market volatility on mortality and cardiovascular events. INT J CARDIOL. 2016;223:318–9.
16. Chen G, Kim KA, Nofsinger JR, Rui OM. Behavior and performance of emerging market investors: Evidence from China. *China International Financial Conference Proceedings* 2006:1–36.
17. Krishnamurthi RV, Ikeda T, Feigin VL. Global, Regional and Country-Specific Burden of Ischaemic Stroke, Intracerebral Haemorrhage and Subarachnoid Haemorrhage: A Systematic Analysis of the Global Burden of Disease Study 2017. *NEUROEPIDEMIOLOGY* 2020:1–9.
18. Tsutsumi A, Kayaba K, Kario K, Ishikawa S. Prospective study on occupational stress and risk of stroke. Arch Intern Med. 2009;169(1):56–61.
19. Chandola T, Britton A, Brunner E, Hemingway H, Malik M, Kumari M, et al. Work stress and coronary heart disease: what are the mechanisms? EUR HEART J. 2008;29(5):640–8.
20. Jackson CA, Kerssens J, Fleetwood K, Smith DJ, Mercer SW, Wild SH. Incidence of ischaemic heart disease and stroke among people with psychiatric disorders: retrospective cohort study. *Br J Psychiatry* 2019:1–8.

21. Barber BM, Odean T. Boys will be Boys: Gender, Overconfidence, and Common Stock Investment. Q J ECON 2001; 116. DOI:10.1162/003355301556400.
22. Sato F, Matsushita S, Hyodo K, Akishima S, Imazuru T, Tokunaga C, et al. Sex difference in peripheral arterial response to cold exposure. CIRC J. 2008;72(8):1367–72.
23. Steptoe A, Kivimaki M. Stress and cardiovascular disease: an update on current knowledge. Annu Rev Public Health. 2013;34:337–54.
24. Dobson AJ, Alexander HM, Malcolm JA, Steele PL, Miles TA. Heart attacks and the Newcastle earthquake. Med J Aust. 1991;155(11–12):757–61.
25. Trichopoulos D, Katsouyanni K, Zavitsanos X, Tzonou A, Dalla-Vorgia P. Psychological stress and fatal heart attack: the Athens (1981) earthquake natural experiment. LANCET. 1983;1(8322):441–4.
26. Kario K. Does earthquake-induced cardiovascular disease persist or is it suppressed after the major quake? J AM COLL CARDIOL. 1998;32(2):553–4.
27. Allegra JR, Mostashari F, Rothman J, Milano P, Cochrane DG. Cardiac events in New Jersey after the September 11, 2001, terrorist attack. J URBAN HEALTH. 2005;82(3):358–63.
28. Chi JS, Speakman MT, Poole WK, Kandefer SC, Kloner RA. Hospital admissions for cardiac events in New York City after September 11, 2001. AM J CARDIOL. 2003;92(1):61–3.
29. Musey PJ, Schultebraucks K, Chang BP. Stressing Out About the Heart: A Narrative Review of the Role of Psychological Stress in Acute Cardiovascular Events. ACAD EMERG MED. 2020;27(1):71–9.
30. Holman EA, Silver RC, Poulin M, Andersen J, Gil-Rivas V, McIntosh DN. Terrorism, acute stress, and cardiovascular health: a 3-year national study following the September 11th attacks. Arch Gen Psychiatry. 2008;65(1):73–80.
31. Huang K, Deng X, He D, Huang D, Wu Q, Wen S, et al. Prognostic implication of earthquake-related loss and depressive symptoms in patients with heart failure following the 2008 earthquake in Sichuan. CLIN CARDIOL. 2011;34(12):755–60.
32. Hare DL, Toukhsati SR, Johansson P, Jaarsma T. Depression and cardiovascular disease: a clinical review. EUR HEART J. 2014;35(21):1365–72.
33. Kaplan JR, Chen H, Manuck SB. The relationship between social status and atherosclerosis in male and female monkeys as revealed by meta-analysis. AM J PRIMATOL. 2009;71(9):732–41.
34. Dickersin K. The existence of publication bias and risk factors for its occurrence. JAMA. 1990;263(10):1385–9.

# Tables

**Table 1.** Characteristics of Included Studies

| Authors and Year of Publication | Outcomes Investigated | Published Journal | Location and Period of Data Obtained | Study Design | Model | No. Events | Variables Controlled | Lags (single/average/both) |
|---|---|---|---|---|---|---|---|---|
| Ma, W.2011 | CHD mortality | European Heart Journal | China，Shanghai，2006-2008 | time-series | over-dispersed generalized linear Poisson models | 22,272 | long-term and seasonal trends，temperature, relative humidity, PM10 and O3 concentrations | both |
| Jonathan Yap.2016 | overall mortality，cardiovascular mortality，incident MI，stroke，HF | International Journal of Cardiology | Singapore，2001-2012 | time-series | generalised linear model | NA | air pollutant levels. | NA |
| Zhang Y.2013 | stroke deaths | Journal of Cardiovascular Medicine | nine urban districts of Shanghai，2006-2008 | time-series | generalized linear model | 29,566 | air pollutant levels，day of the week，temperature, humidity | both |
| Lin H，2013 | Cardiovascular Mortality | PLOS ONE | Taishan and Guangzhou, 2006-2010 | time-series | generalised linear model and distributed lag non-linear model | 41,085 | public holidays, day of the week, temperature, humidity, air pollutant levels | both |

**Table 2.** Relationship between Stock volatility and CVD mortality: Lag patterns.

| Subtypes | Lag 01 | Lag 04 | Lag 1 | Lag 2 | Lag 3 | Lag 4 |
|---|---|---|---|---|---|---|
| **Number of estimated articles** | 2 | 2 | 2 | 2 | 2 | 2 |
| **Effect Size (95% CI)** | 4.026% (1.516% to 6.536%) | 4.424% (1.145% to 7.703%) | 2.425% (0.11% to 4.74%) | 0.061% (-2. 726% to 2.848% ) | 3.775% (1.018% to 6.532%). | 1.018% (-1.823% to 3.859%) |
| **Heterogeneity, $I^2$,%** | 0 | 0 | 77.2 | 16 | 0 | 0 |
| **Model** | Fixed | Fixed | Random | Fixed | Fixed | Fixed |

# Figures

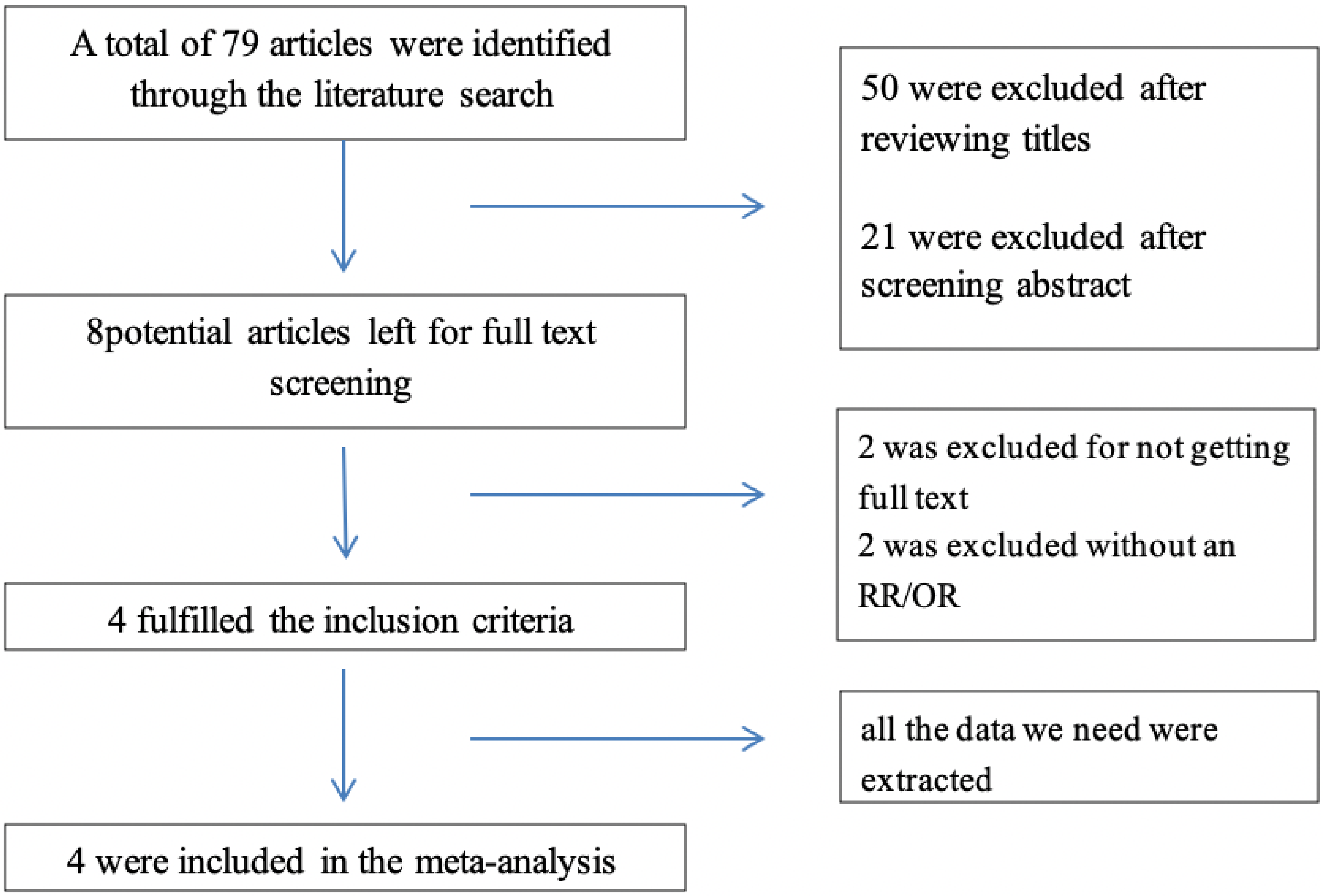
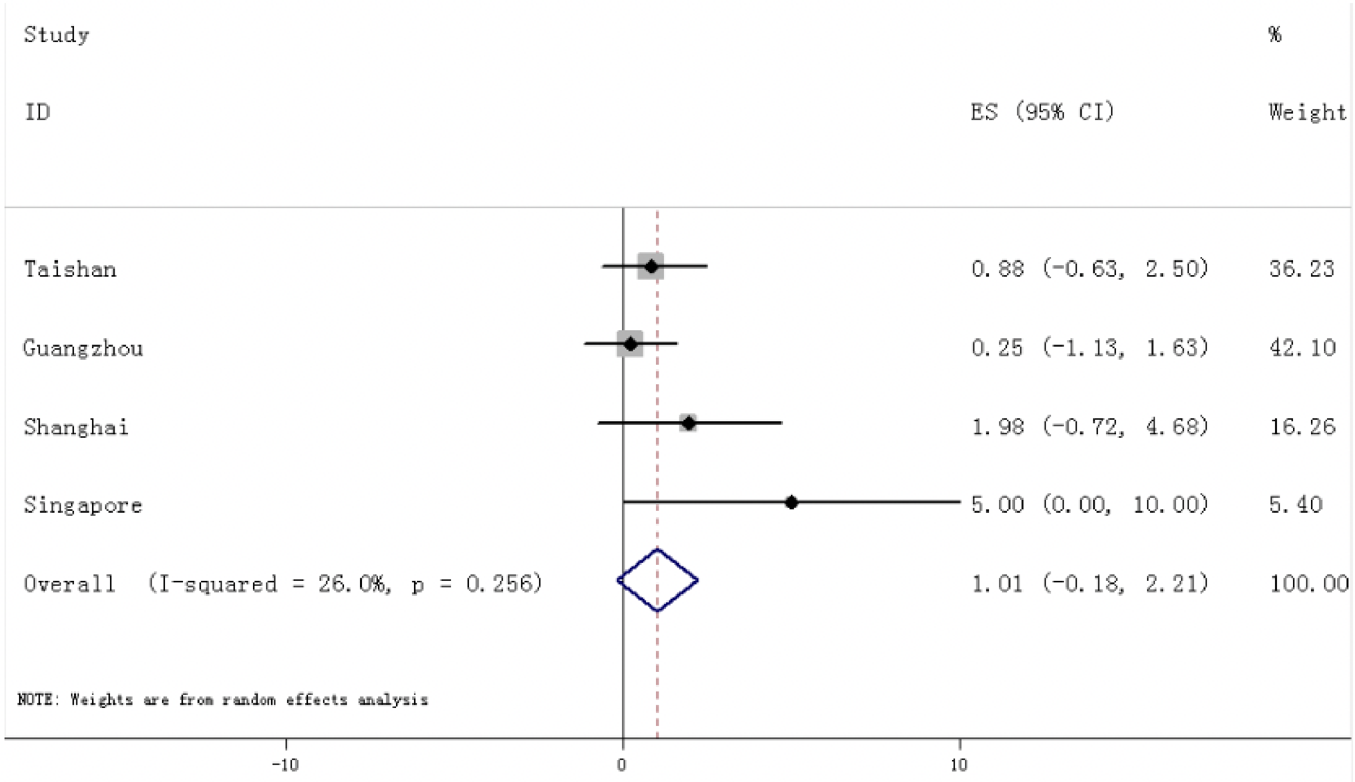


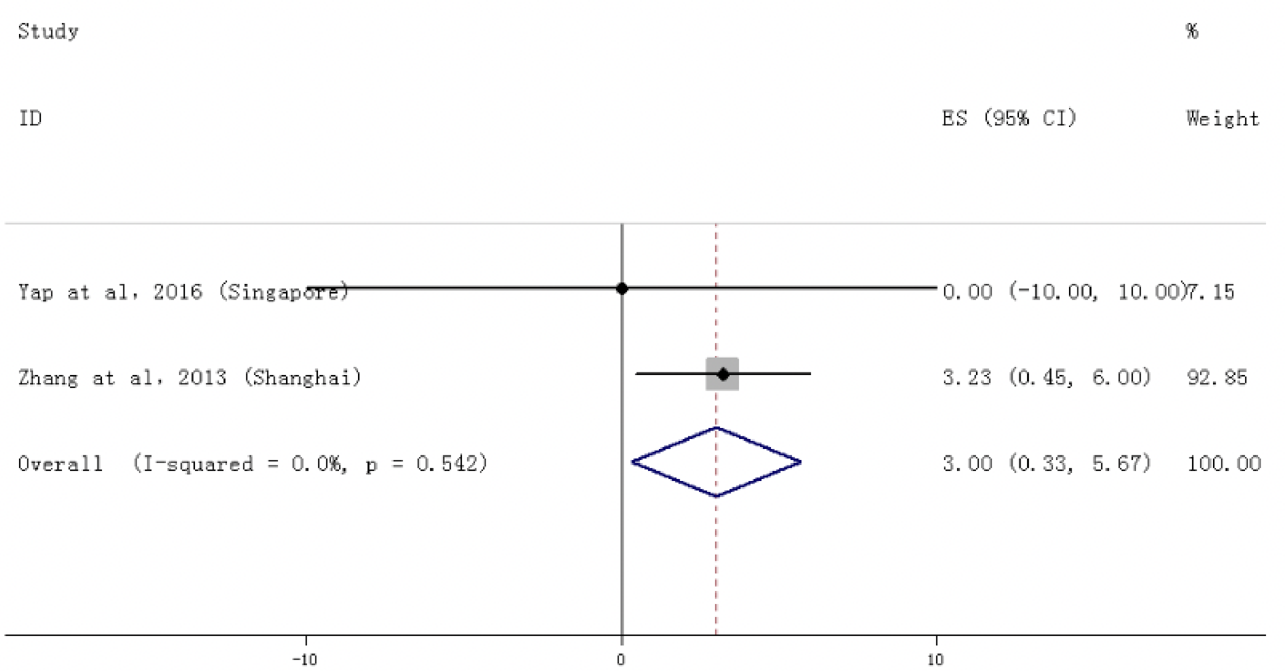

**Figure 1**

Flow of information through the different phases of a systematic review.




## Figure 3

Forrest plots: Relationship between Stock volatility and Cardiovascular Mortality. The result from Shanghai is the pooled estimates from 2 studies.




## Figure 5

Forrest plots: Relationship between Stock volatility and Stroke events.

# Supplementary Files

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