Electronic Supplementary Material (ESI) for Food & Function.

Breakfast Skipping and Risk of All-cause, Cardiovascular and Cancer Mortality among Adults: A Systematic Review and Meta-Analysis of Prospective Cohort Studies

Table S1. Systematic literature review search terms and strategy.

Search terms for PubMed (n=1930), until 18 July 2023
#1 ("cerebrovascular disorders" [Mesh] OR "Cardiovascular Diseases"[Mesh] OR "cerebrovascular disorders" [Title/Abstract] OR "cardiovascular" [Title/Abstract] OR "coronary" [Title/Abstract] OR "CVD" [Title/Abstract] OR "CHD" [Title/Abstract] OR "stroke" [Title/Abstract] OR "cerebrovascular disease" [Title/Abstract] OR "cerebrovascular disorders" [Title/Abstract] OR "heart disease" [Title/Abstract] OR "myocardial infarction" [Title/Abstract] OR "MI" [Title/Abstract] OR "heart failure" [Title/Abstract] OR "cerebral vascular accident" [Title/Abstract] OR "CVA" [Title/Abstract])
#2 "mortality" [Mesh] OR "death" [Mesh] OR "survival" [Mesh] OR "death*" [Title/Abstract] OR "fatal" [Title/Abstract] OR "surviv*" [Title/Abstract] OR "all cause*" [Title/Abstract]
#3 "Neoplasms"[Mesh] OR "Cancer Survivors"[Mesh] OR "cancer*"[Title/Abstract] OR "tumor*[Title/Abstract]" OR "tomour*"[Title/Abstract]
#4 (“breakfast” [Mesh] OR breakfast*[Title/Abstract] OR “dinner” [Title/Abstract] OR meal*[Title/Abstract] OR “meal timing” [Title/Abstract] OR “eating patterns” [Title/Abstract] OR “feeding behavior”[Title/Abstract] OR “meal regularity” [Title/Abstract]) OR ((breakfast*[Title/Abstract] OR meal*[Title/Abstract]) AND (skip*[Title/Abstract] OR frequen*[Title/Abstract] OR omit*[Title/Abstract] OR omis*[Title/Abstract] OR consum*[Title/Abstract] OR pattern*[Title/Abstract]))
#5 ("prospective" OR "longitudinal" OR "cohort" OR "cohorts" OR "follow-up" OR "followed up")
(#1 OR #2 OR #3) AND #4 AND #5
Search terms for Embase (n=3758), until 18 July 2023
#1 'cerebrovascular disease'/exp OR 'cardiovascular disease'/exp OR ‘cerebrovascular disorders’:ab,ti OR ‘cardiovascular’:ab,ti OR ‘coronary’:ab,ti OR ‘CVD’:ab,ti OR ‘CHD’:ab,ti OR ‘stroke’:ab,ti OR ‘cerebrovascular disease’:ab,ti OR ‘cerebrovascular disorders’:ab,ti OR ‘heart disease’:ab,ti OR ‘myocardial infarction’:ab,ti OR ‘MI’:ab,ti OR ‘heart failure’:ab,ti OR ‘cerebral vascular accident’:ab,ti OR ‘CVA’:ab,ti
#2 'mortality'/exp OR 'death'/exp OR 'survival'/exp OR mortalit*:ab,ti OR death*:ab,ti OR fatal:ab,ti OR surviv*:ab,ti OR all cause*:ab,ti
#3 'neoplasm'/exp OR 'cancer survivor'/exp OR cancer*:ab,ti OR tumor*:ab,ti OR tomour*:ab,ti
#4 ('breakfast skipping'/exp OR 'meal skipping'/exp OR 'meal frequency'/exp OR 'eating pattern'/exp 'breakfast'/exp or 'meal'/exp OR breakfast:ab,ti OR meal:ab,ti OR dinner:ab,ti OR 'meal timing':ab,ti OR 'eating patterns':ab,ti OR 'feeding behavior':ab,ti OR 'meal regularity':ab,ti) OR ((breakfast:ab,ti OR meal:ab,ti) And (skip*:ab,ti OR frequen*:ab,ti OR omit*:ab,ti OR omis*:ab,ti or consum*:ab,ti or pattern*:ab,ti))
#5 'cohort analysis'/exp OR 'longitudinal study'/exp OR 'prospective study'/exp OR 'follow up'/exp OR 'prospective':ab,ti OR 'longitudinal':ab,ti OR 'cohort':ab,ti OR 'cohorts':ab,ti OR 'follow-up':ab,ti OR 'followed up':ab,ti
(#1 OR #2 OR #3) AND #4 AND #5
Search terms for Web of Science (n= 3785), until 18 July 2023
#1 TS= ('cerebrovascular disease' OR 'cardiovascular disease' OR 'cerebrovascular disorders' OR 'cardiovascular' OR 'coronary' OR 'CVD' OR 'CHD' OR 'stroke' OR 'cerebrovascular disease' OR 'cerebrovascular disorders' OR 'heart disease' OR 'myocardial infarction' OR 'MI' OR 'heart failure' OR 'cerebral vascular accident' OR 'CVA')
#2 TS= (mortality OR mortalit* death OR death* OR surviv* OR fatal OR all cause*)
#3 TS= (neoplasm OR cancer survivor OR cancer* OR tumor* OR tomour*)
#4 TS= (('breakfast skipping' OR 'meal skipping' OR 'meal frequency' OR 'eating pattern' OR 'breakfast' or 'meal' OR dinner OR 'meal timing' OR 'feeding behavior' OR 'meal regularity’) OR ((breakfast OR meal) And (skip* OR frequen* OR omit* OR omis* or consum* or pattern*)))
#5 TS= ("prospective" OR "longitudinal" OR "cohort" OR "cohorts" OR "follow-up" OR "followed up")
(#1 OR #2 OR #3) AND #4 AND #5

Table S2. The list of excluded studies during the full text screening stage.

Exclusion reason	Reference number
Reviews, meta-analysis	1-9
Not the relevant exposure	10-32
Not the relevant outcome	33-55
Conference	56-59
Same cohort	60, 61
Not available	62, 63

Reference list

1. A. Paoli, G. Tinsley, A. Bianco and T. Moro, The influence of meal frequency and timing on health in humans: The role of fasting, *Nutrients*, 2019, **11**.
2. R. Ofori-Asenso, A. J. Owen and D. Liew, Skipping breakfast and the risk of cardiovascular disease and death: A systematic review of prospective cohort studies in primary prevention settings, *Journal of Cardiovascular Development and Disease*, 2019, **6**, 1-11.
3. Z. H. Li, L. Xu, R. Dai, L. J. Li and H. J. Wang, Effects of regular breakfast habits on metabolic and cardiovascular diseases: A protocol for systematic review and meta-analysis, *Medicine (United States)*, 2021, **100**.
4. Z. Li, H. Li, Q. Xu and Y. Long, Skipping Breakfast Is Associated with Hypertension in Adults: A Meta-Analysis, *International Journal of Hypertension*, 2022, **2022**.
5. H. Z. Chen, B. D. Zhang, Y. S. Ge, H. Shi, S. Q. Song, W. S. Xue, J. W. Li, K. L. Fu, X. X. Chen, W. Y. Teng and L. Tian, Association between skipping breakfast and risk of cardiovascular disease and all cause mortality: A meta-analysis, *Clinical Nutrition*, 2020, **39**, 2982-2988.
6. H. Takagi, Y. Hari, K. Nakashima, T. Kuno and T. Ando, Meta-Analysis of Relation of Skipping Breakfast With Heart Disease, *American Journal of Cardiology*, 2019, **124**, 978-986.
7. M. Higgins, Epidemiology and prevention of coronary heart disease in families, *American Journal of Medicine*, 2000, **108**, 387-395.
8. R. Gupta, Prevention of coronary heart disease among Indians: Focus on primary prevention, *Journal of the Indian Medical Association*, 2000, **98**, 703-709.
9. K. D'cunha, Y. Park, M. M. Protani and M. M. Reeves, Circadian rhythm disrupting behaviours and cancer outcomes in breast cancer survivors: a systematic review, *Breast Cancer Research and Treatment*, 2023, **198**, 413-421.
10. K. Sakai, H. Okada, M. Hamaguchi, N. Nishioka, Y. Tateyama, T. Shimamoto, K. Kurogi, H. Murata, M. Ito, T. Iwami and M. Fukui, Eating Behaviors and Incident Cardiovascular Disease in Japanese People: The Population-Based Panasonic Cohort Study 14, *Current Problems in Cardiology*, 2023, **48**.
11. D. E. King and J. Xiang, A relationship between mortality and eating breakfast and fiber, *Journal of the American Board of Family Medicine*, 2021, **34**, 678-687.
12. W. Wei, W. B. Jiang, J. X. Huang, J. X. Xu, X. Y. Wang, X. T. Jiang, Y. Wang, G. L. Li, C. H. Sun, Y. Li and T. S. Han, Association of Meal and Snack Patterns With Mortality of All-Cause, Cardiovascular Disease, and Cancer: The US National Health and Nutrition Examination Survey, 2003 to 2014, *Journal of the American Heart Association*, 2021, **10**.
13. P. Wang, X. Jiang, Q. Tan, S. Du and D. Shi, Meal timing of dietary total antioxidant capacity and its association with all-cause, CVD and cancer mortality: the US national health and nutrition examination survey, 1999–2018, *International Journal of Behavioral Nutrition and Physical Activity*, 2023, **20**.
14. M. Wakasugi, I. Narita, K. Iseki, K. Asahi, K. Yamagata, S. Fujimoto, T. Moriyama, T. Konta, K. Tsuruya, M. Kasahara, Y. Shibagaki, M. Kondo and T. Watanabe, The Effect of CKD on Associations between Lifestyle Factors and All-cause, Cancer, and Cardiovascular Mortality: A Population-based Cohort Study, *Internal Medicine*, 2021, **60**, 2189-2200.
15. P. C. Vinke, G. Navis, D. Kromhout and E. Corpeleijn, Associations of Diet Quality and All-Cause Mortality Across Levels of Cardiometabolic Health and Disease: A 7.6-Year Prospective Analysis From the Dutch Lifelines Cohort, *Diabetes Care*, 2021, **44**, 1228-1235.
16. Y. Tokushima, T. Hosoda, M. Okamoto and Y. Kurozawa, Psychological factors and mortality risk in a rural area of Japan, *Yonago Acta Medica*, 2014, **57**, 73-83.
17. A. Tirosh, A. Rudich, T. Shochat, D. Tekes-Manova, E. Israeli, Y. Henkin, I. Kochba and I. Shai, Changes in triglyceride levels and risk for coronary heart disease in young men, *Annals of Internal Medicine*, 2007, **147**, 377-385.
18. A. O. Odegaard, W. P. Koh, J. M. Yuan, M. D. Gross and M. A. Pereira, Western-Style Fast Food Intake and Cardiometabolic Risk in an Eastern Country, *Circulation*, 2012, **126**, 182-188.
19. A. Nigam, M. G. Bourassa, A. Fortier, M. C. Cuertin and J. C. Tardif, Fasting but not postprandial (postmeal) glycemia predicts the risk of death in subjects with coronary artery disease, *Canadian Journal of Cardiology*, 2007, **23**, 873-878.
20. A. K. Kant and B. I. Graubard, Clock Time of First Eating Episode and Prospective Risk of All-Cause Mortality in US Adults, *Journal of Nutrition*, 2022, **152**, 217-226.
21. W. Jiang, Q. Song, J. Zhang, Y. Chen, H. Jiang, Y. Long, Y. Li, T. Han, H. Sun and W. Wei, The Association of Consumption Time for Food With Cardiovascular Disease and All-Cause Mortality Among Diabetic Patients, *J Clin Endocrinol Metab*, 2022, **107**, e3066-e3075.

22. J. C. Hays, H. H. Keller and T. Østbye, The effects of nutrition-related factors on four-year mortality among a biracial sample of community-dwelling elders in the North Carolina Piedmont, *Journal of Nutrition for the Elderly*, 2006, **25**, 41-67.
23. T. Han, J. Gao, L. Wang, C. Li, L. Qi, C. Sun and Y. Li, The Association of Energy and Macronutrient Intake at Dinner Versus Breakfast With Disease-Specific and All-Cause Mortality Among People With Diabetes: The U.S. National Health and Nutrition Examination Survey, 2003-2014, *Diabetes Care*, 2020, **43**, 1442-1448.
24. S. M. George, R. Ballard-Barbash, J. E. Manson, J. Reedy, J. M. Shikany, A. F. Subar, L. F. Tinker, M. Vitolins and M. L. Neuhouser, Comparing Indices of Diet Quality With Chronic Disease Mortality Risk in Postmenopausal Women in the Women's Health Initiative Observational Study: Evidence to Inform National Dietary Guidance, *American Journal of Epidemiology*, 2014, **180**, 616-625.
25. A. R. Folsom, E. D. Parker and L. J. Harnack, Degree of concordance with DASH diet guidelines and incidence of hypertension and fatal cardiovascular disease, *American Journal of Hypertension*, 2007, **20**, 225-232.
26. R. di Giuseppe, A. Di Castelnuovo, C. Melegari, F. De Lucia, I. Santimone, A. Sciarretta, P. Barisciano, M. Persichillo, A. De Curtis, F. Zito, V. Krogh, M. B. Donati, G. de Gaetano and L. Iacoviello, Typical breakfast food consumption and risk factors for cardiovascular disease in a large sample of Italian adults, *Nutrition, Metabolism and Cardiovascular Diseases*, 2012, **22**, 347-354.
27. L. de Groot, M. W. Verheijden, S. de Henauw, M. Schroll and W. A. van Staveren, Lifestyle, Nutritional status, health, and mortality in Elderly people across Europe: A review of the longitudinal results of the SENECA study, *Journals of Gerontology Series a-Biological Sciences and Medical Sciences*, 2004, **59**, 1277-1284.
28. H. J. Chen, Y. F. Wang and L. J. Cheskin, Relationship between frequency of eating and cardiovascular disease mortality in US adults: the NHANES III follow-up study, *Annals of Epidemiology*, 2016, **26**, 527-533.
29. H. Cai, X. O. Shu, Y. T. Gao, H. L. Li, G. Yang and W. Zheng, A prospective study of dietary patterns and mortality in Chinese women, *Epidemiology*, 2007, **18**, 393-401.
30. M. Arvanitakis, We Are What We Eat: The Association Between Ultra-Processed Food Consumption, Colon Cancer Risk and All-Cause Mortality, *Gastroenterology*, 2023, **164**, 697-698.
31. M. Aizawa, K. Murakami, I. Takahashi, T. Onuma, A. Noda, F. Ueno, F. Matsuzaki, M. Ishikuro, T. Obara, H. Hamada, N. Iwama, M. Saito, J. Sugawara, N. Yaegashi and S. Kuriyama, Skipping breakfast during pregnancy and hypertensive disorders of pregnancy in Japanese women: the Tohoku medical megabank project birth and three-generation cohort study, *Nutrition Journal*, 2022, **21**.
32. J. Xie, Z. W. Wang, X. Zhang, J. J. Wang, W. Feng, Y. F. Hu, N. F. Liu and Y. Liu, Association between daily eating frequency and mortality in people with diabetes: Findings from NHANES 1999-2014, *Frontiers in Nutrition*, 2023, **10**.
33. Q. M. Li, C. K. Wu, P. C. Ma, H. Cui, R. N. Li, C. Hong, L. Zeng, S. W. Liao, L. S. Xiao, L. Liu and W. Y. Li, Breakfast consumption frequency is associated with dyslipidemia: a retrospective cohort study of a working population, *Lipids in Health and Disease*, 2022, **21**.
34. Y. Kubota, H. Iso, N. Sawada and S. Tsugane, Association of Breakfast Intake with Incident Stroke and Coronary Heart Disease : the Japan Public Health Center-Based Study, *Stroke*, 2016, **47**, 477-481.
35. H. Kaneko, H. Itoh, H. Kiriyama, T. Kamon, K. Fujiu, K. Morita, N. Michihata, T. Jo, N. Takeda, H. Morita, H. Yasunaga and I. Komuro, Possible association between eating behaviors and cardiovascular disease in the general population: Analysis of a nationwide epidemiological database, *Atherosclerosis*, 2021, **320**, 79-85.
36. L. E. Cahill, S. E. Chiuve, R. A. Mekary, M. K. Jensen, A. J. Flint, F. B. Hu and E. B. Rimm, Prospective study of breakfast eating and incident coronary heart disease in a cohort of male US health professionals, *Circulation*, 2013, **128**, 337-343.
37. I. Uzhova, V. Fuster, A. Fernández-Ortiz, J. M. Ordovás, J. Sanz, L. Fernández-Friera, B. López-Melgar, J. M. Mendiguren, B. Ibáñez, H. Bueno and J. L. Peñalvo, The Importance of Breakfast in Atherosclerosis Disease: Insights From the PESA Study, *Journal of the American College of Cardiology*, 2017, **70**, 1833-1842.
38. J. Tang, J. Y. Dong, E. S. Eshak, R. Cui, K. Shirai, K. Liu, R. Sakaniwa, A. Tamakoshi and H. Iso, Supper timing and cardiovascular mortality: The Japan collaborative cohort study, *Nutrients*, 2021, **13**.
39. K. Sharma, K. Shah, P. Brahmbhatt and Y. Kandre, Skipping breakfast and the risk of coronary artery disease, *QJM*, 2018, **111**, 715-719.
40. X. W. Shang, Y. P. Li, H. Q. Xu, Q. Zhang, X. Q. Hu, A. L. Liu, S. M. Du, T. Y. Li, H. W. Guo, Y. Li, G. F. Xu, W. J. Liu, J. Ma and G. Ma, Healthy breakfast habits and changes in obesity-related cardiometabolic markers in children: a longitudinal analysis, *European Journal of Clinical Nutrition*, 2020, **74**, 1685-1697.
41. T. Mita, Y. Osonoi, T. Osonoi, M. Saito, S. Nakayama, Y. Someya, H. Ishida, M. Gosho and H. Watada, Breakfast skipping is associated with persistently increased arterial stiffness in patients with type 2 diabetes, *BMJ Open Diabetes Research and Care*, 2020, **8**.
42. U. Meyer, C. Schindler, T. Bloesch, E. Schmocker, L. Zahner, J. J. Puder and S. Kriemler, Combined impact of negative lifestyle factors on cardiovascular risk in children: A randomized prospective study, *Journal of Adolescent Health*, 2014, **55**, 790-795.
43. H. L. Metzner, W. J. Carman and J. House, Health practices, risk factors, and chronic disease in Tecumseh, *Preventive Medicine*, 1983, **12**, 491-507.
44. T. Liu, Y. M. Wang, X. M. Wang, C. A. Liu, Q. Zhang, M. M. Song, C. H. Song, Q. S. Zhang and H. P. Shi, Habitually Skipping Breakfast Is Associated with the Risk of Gastrointestinal Cancers: Evidence from the Kailuan Cohort Study, *Journal of General Internal Medicine*, 2023, DOI: 10.1007/s11606-023-08094-7.
45. H. J. Lee, J. Jang, S. A. Lee, D. W. Choi and E. C. Park, Association between breakfast frequency and atherosclerotic cardiovascular disease Risk: A cross-sectional study of KNHANES data, 2014-2016, *International Journal of Environmental Research and Public Health*, 2019, **16**.

46. Z. Konidari, C. M. Kastorini, H. J. Milionis, E. Bika, V. Nikolaou, K. N. Vemmos, J. A. Goudevenos and D. B. Panagiotakos, Eating behaviors and their relationship with cardiovascular disease. A case/case-control study, *Appetite*, 2014, **80**, 89-95.
47. H. Itoh, H. Kaneko, A. Okada, Y. Suzuki, K. Fujiu, S. Matsuoka, N. Michihata, T. Jo, K. Nakanishi, N. Takeda, H. Morita, K. Node, M. R. Di Tullio, S. Homma, H. Yasunaga and I. Komuro, Age-Specific Relation of Cardiovascular Health Metrics With Incident Cardiovascular Disease, *American Journal of Cardiology*, 2022, **177**, 34-39.
48. V. Hirschler, T. Meroño, G. Maccallini, L. Gomez Rosso, C. Aranda and F. Brites, Impact of unhealthy lifestyle behaviors and obesity on cholesteryl ester transfer protein among adolescent males, *Archives of Medical Research*, 2011, **42**, 53-59.
49. V. Elahy, C. Thomson, M. L. Neuhouser, L. H. Jiang, S. M. Lee, K. T. Y. Pan, M. Vitolins, R. Chlebowski, D. Lane and A. O. Odegaard, Frequency of Consuming Breakfast Meals and After-Dinner Snacks Is not Associated with Postmenopausal Breast Cancer Risk: Women's Health Initiative Observational Study, *Journal of Nutrition*, 2023, **153**, 1089-1100.
50. X. A. Du, R. Yang, M. D. Ma, S. Q. Ke, J. Zheng and X. D. Tan, The association of energy and macronutrient intake at breakfast and cardiovascular disease in Chinese adults: From a 14-year follow-up cohort study, *Frontiers in Nutrition*, 2023, **10**.
51. P. Chen, Y. Lin, K. Zheng, B. Liu, C. Wu, W. Yan and Y. Cai, Risk Factors of Gastric Cancer in High-Risk Region of China: A Population-Based Case-control Study, *Asian Pacific journal of cancer prevention : APJCP*, 2019, **20**, 775-781.
52. S. U. Cayres, I. F. F. Junior, M. F. Barbosa, D. G. D. Christofaro and R. A. Fernandes, Breakfast frequency, adiposity, and cardiovascular risk factors as markers in adolescents, *Cardiology in the Young*, 2016, **26**, 244-249.
53. L. Breslow and J. E. Enstrom, Persistence of health habits and their relationship to mortality, *Preventive Medicine*, 1980, **9**, 469-483.
54. K. Y. An, Physical activity level in Korean adults: the Korea National Health and Nutrition Examination Survey 2017, *Epidemiology and Health*, 2019, **41**.
55. L. M. Goff, P. Y. Huang, M. J. Silva, C. Bordoli, E. Z. Enayat, O. R. Molaodi, A. Cassidy, M. Maynard and S. Harding, Associations of dietary intake with cardiometabolic risk in a multi-ethnic cohort: a longitudinal analysis of the Determinants of Adolescence, now young Adults, Social well-being and Health (DASH) study, *British Journal of Nutrition*, 2019, **121**, 1069-1079.
56. G. Weidner, Lifestyle and the failing heart, *Verhaltenstherapie*, 2011, **21**, 1.
57. A. Furusawa, R. Kido, M. Murasawa, D. Uchida, S. Fujimoto, K. Iseki, T. Moriyama, K. Yamagata, K. Tsuruya, T. Konta, I. Narita, M. Kondo, M. Kasahara, K. Asahi, T. Watanabe, Y. Shibagaki and H. Kawarazaki, Chronic kidney disease and the association of self-assessed lifestyle behaviors with mortality in a large Japanese general population, *Nephrology Dialysis Transplantation*, 2017, **32**, iii219-iii221.
58. L. E. Cahill, S. E. Chiuve, R. A. Mekary, M. K. Jensen, A. J. Flint, F. B. Hu and E. B. Rimm, A prospective study of eating habits and incident coronary heart disease in a cohort of male U.S. health professionals, *Circulation*, 2012, **125**.
59. L. Cahill, S. Chiuve, R. Mekary, M. Jensen, A. Flint, F. Hu, K. Mukamal, K. Rexrode and E. Rimm, Breakfast eating and incident coronary heart disease in a large prospective cohort of American women, *FASEB Journal*, 2015, **29**.
60. D. L. Wingard, L. F. Berkman and R. J. Brand, A multivariate analysis of health-related practices. A nine-year mortality follow-up of the Alameda County Study, *American Journal of Epidemiology*, 1982, **116**, 765-775.
61. S. Rong, L. G. Snetselaar, G. F. Xu, Y. B. Sun, B. Y. Liu, R. B. Wallace and W. Bao, Association of Skipping Breakfast With Cardiovascular and All-Cause Mortality, *Journal of the American College of Cardiology*, 2019, **73**, 2025-2032.
62. H. Iso and Y. Kubota, Nutrition and Disease in the Japan Collaborative Cohort Study for Evaluation of Cancer, *Asian Pacific Journal of Cancer Prevention*, 2007, **8**, 35-80.
63. H. S. Nisselson, The Perils of Skipping Breakfast, *Journal of the New Jersey Dental Association*, 2015, **86**, 4.

Table S3. Quality assessment of included studies using the Newcastle-Ottawa Scale for the association between breakfast skipping and risk of all-cause, cardiovascular and cancer mortality.

First author (year)	Study Selection				Comparability of cohorts		Outcome			Total
	a	b	c	d	e	f	g	h	i	
All-cause mortality										
Sun 2023 [15]	1	1	1	1	1	1	1	1	1	9
Helo 2021 [5]	1	1	1	1	1	1	1	1	1	9
Yokoyama 2016 [14]	1	1	0	1	1	1	1	1	0	7
Byrne 2016 [16]	0	1	0	1	0	0	0	1	1	4
Nakano 2006 [17]	1	1	0	1	0	0	1	0	1	5
Kaplan 1987 [19]	1	1	0	1	1	1	1	1	1	8
CVD mortality										
Sun 2023 [15]	1	1	1	1	1	1	1	1	1	9

Xie 2022 [20]	0	1	1	1	1	1	1	1	0	7
Tang 2022 [21]	1	1	0	1	1	1	1	1	1	8
Carew 2022 [22]	1	1	1	1	1	1	1	1	0	8
Cancer mortality										
Helo 2021 [5]	1	1	1	1	1	1	1	1	1	9
Yokoyama 2016 [14]	1	1	0	1	1	1	1	1	0	7

a. Representativeness of the exposed cohort; b. Selection of the non-exposed cohort; c. Ascertainment of exposure; d. Demonstration that outcome of interest was not present at start of study; e. Comparability of cohorts on the basis of the design or analysis (adjusted for the most important factor: age); f. Comparability of cohorts on the basis of the design or analysis (adjusted for secondary important factors: sex, or underlying diseases, or dietary and exercise behaviors); g. Assessment of outcome; h. Was follow-up long enough for outcomes to occur; i. Adequacy of follow-up of cohorts.

Table S4**.** Sensitivity analysis of breakfast skipping and risk of all-cause, cardiovascular and cancer mortality for the highest versus lowest meta-analysis.

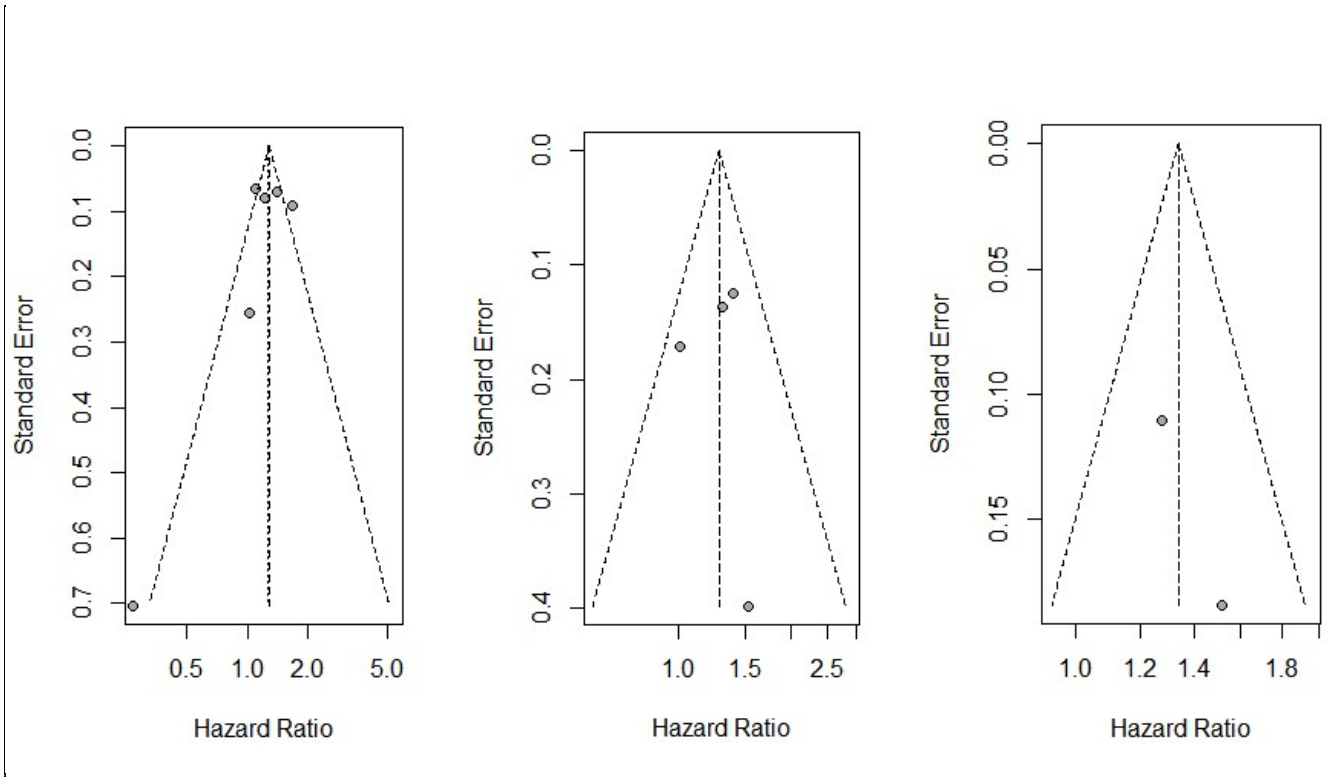
Study omitted	**HR**	**95% CI**	
All-cause mortality			
Sun 2023 [15]	1.33	1.10	1.61
Helo 2021 [5]	1.20	1.05	1.37
Yokoyama 2016 [14]	1.22	0.96	1.54
Byrne 2016 [16]	1.30	1.08	1.56
Nakano 2006 [17]	1.30	1.10	1.54
Kaplan 1987 [19]	1.26	1.00	1.60
CVD mortality			
Sun 2023 [15]	1.20	0.97	1.50
Xie 2022 [20]	1.27	1.08	1.50
Tang 2022 [21]	1.25	0.96	1.63
Carew 2022 [22]	1.37	1.15	1.63
Cancer mortality			
Helo 2021 [5]	1.28	1.03	1.59
Yokoyama 2016 [14]	1.52	1.06	2.18

HR, hazard ratio; CI, confidence interval

Table S5. GRADE evidence profile for observational studies of breakfast skipping and risk of all-cause, cardiovascular and cancer mortality.

Outcome	№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Hazard Ratio (95% CI)	Certainty
All-cause mortality	6	Observational studies	Not serious	Serious [a]	Not serious	Not serious	None	1.28 (1.12-1.45)	⊕◯◯◯ Very low
CVD mortality	4	Observational studies	Not serious	Not serious	Not serious	Not serious	None	1.28 (1.10-1.50)	⊕⊕◯◯ Low
Cancer mortality	2	Observational studies	Not serious	Not serious	Not serious	Not serious	None	1.34 (1.11-1.61)	⊕⊕◯◯ low

[a] Serious inconsistency for all-cause mortality due to high degree of unexplained heterogeneity.



(A) (B) (C)

Figure S1. Funnel plots for the detection of publication bias of included studies for highest versus lowest breakfast skipping and risk of all-cause, cardiovascular and cancer mortality. (A) All-cause mortality; (B) Cardiovascular mortality; (C) Cancer mortality.