

Table S1. Search Strategies

Database	Run Date	Keywords
PubMed	13/8/2024	Obesity AND (BMI OR 'body mass index') AND ('colon cancer' OR 'bowel cancer' OR 'colorectal cancer' OR 'colorectal carcinoma' OR 'rectal cancer') AND registry
Cochrane	13/8/2024	Obesity AND (BMI OR 'body mass index') AND ('colon cancer' OR 'bowel cancer' OR 'colorectal cancer' OR 'colorectal carcinoma' OR 'rectal cancer') AND registry
Embase via Elsevier	13/8/2024	('obesity'/exp OR obesity) AND ('bmi'/exp OR bmi OR 'body mass index'/exp OR 'body mass index') AND ('colon cancer'/exp OR 'colon cancer' OR 'bowel cancer'/exp OR 'bowel cancer' OR 'colorectal cancer'/exp OR 'colorectal carcinoma'/exp OR 'colorectal carcinoma' OR 'rectal cancer'/exp OR 'rectal cancer') AND ('registry'/exp OR registry) AND (2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py OR 2016:py OR 2017:py OR 2018:py OR 2019:py OR 2020:py OR 2021:py OR 2022:py OR 2023:py OR 2024:py) AND ('case control study'/de OR 'cross sectional study'/de OR 'population based case control study'/de OR 'prospective study'/de OR 'retrospective study'/de)
SCOPUS via Elsevier	13/8/2024	TITLE-ABS-KEY (obesity AND (bmi OR "body mass index") AND ("colon cancer" OR "bowel cancer" OR "colorectal cancer" OR "colorectal carcinoma" OR "rectal cancer")) AND registry)

Table S2. Characteristics of included studies investigating the association between obesity and CRC

Author, year	Setting/Country	Sample	Registry	Obesity Definition Used	Gender proportion	Covariates	Follow-up duration (years)	Incidence Ratio
Nock et al., 2008 (23)	USA	929; Cases: 438 Controls: 491	Kentucky cancer registry	WHO Obesity Definition (≥ 30)	Cases: Male (49.5%) Female (50.5%) Controls: Male (37.9%) Female (62.1%)	Age, race, gender, education, income, physical activity, smoking, alcohol, nonsteroidal anti-inflammatory drugs use, family history of colorectal cancer.	N/A	1.31 OR (0.86 - 2.01)
Wang et al., 2008 (25)	USA	95151	21 population-based state cancer registries	WHO Obesity Definition (≥ 30)	Male: 44068 (46.3%) Female: 51083 (53.7%)	Height, education, physical activity, smoking, alcohol intake, NSAID use, multivitamin use, history of colorectal endoscopy	8 years	Male: 1.24 RR (0.96-1.62) Female: 1.50 RR (1.11-2.01)
Song et al., 2008 (26)	Korea	59697	Korea central cancer registry (KCCR), serious diseases registry (SDR)	WHO Obesity Definition for Asian Individuals (≥ 25)	Female	Age, height, smoking status, alcohol intake, physical exercise, pay level at study entry	9 years (maximum)	1.51 HR (1.14 – 2.03)
Bassett et al., 2010 (27)	Australia	39626	Victorian cancer registry	WHO Obesity Definition (≥ 30)	Male: 16188 (40.9%) Female: 23,438 (59.1%)	Country of birth, education, processed and fresh meat consumption, fruit and vegetable consumption, fat intake, daily energy intake, smoking status, alcohol consumption	14 years	Male: 1.51 HR (1.00-2.28) Female: 1.00 HR (0.70-1.44)
Oxentenko et al., 2011 (28)	USA	8558	State health registry of Iowa	WHO Obesity Definition (≥ 30)	Female	Age, age at menopause, exogenous estrogen use, oral contraceptive use, smoking status, cigarette pack-years, physical activity level, self-reported diabetes mellitus, alcohol, diet		1.31 RR (1.12-1.54)
Li et al., 2013 (29)	China	26916	Shanghai cancer registry	WHO Obesity Category (≥ 30)	Male: 12 299 (45.7%) Female: 14 617 (54.3%)	Age at baseline, education, income, cigarette use, alcohol consumption, tea consumption, physical activity, family history of colorectal cancer, menopausal status, intakes of total energy, red meat, fruits and vegetables	Male: 5.5 years Female: 11 years	Male: 1.74 HR (1.01 - 3.01) Female: 0.89 HR (0.63 - 1.25)
Han et al., 2014 (30)	USA	708	Maryland cancer registry	WHO Obesity Definition (≥ 30)	Male: 401(56.7%) Female: 307 (43.4%)	Education, cigarette smoking, alcohol consumption, physical activity and reproductive history	9 years	Male: 1.65 HR (0.87 - 3.11) Female: 1.10 HR (0.44 - 2.78)
Kantor et al., 2016 (31)	Sweden	2364	Swedish cancer registry	WHO Obesity Definition (≥ 30)	Male	Age at conscription, EVF, household crowding health status; systolic blood pressure, diastolic blood pressure, muscular strength, physical working capacity, cognitive function.	41 years	2.50 HR (1.58-3.95)
Hanyuda et al., 2017 (32)	USA	120813	36 state cancer registries	WHO Obesity Definition (≥ 30)	Male: 45001 (37.2%) Female: 75812 (62.8%)	Family history of colorectal cancer, history of colonoscopy/sigmoidoscopy, smoking in pack-years, physical activity, red and processed meat intake, alcohol consumption, current multivitamin use, regular use of aspirin, regular use of non-steroidal anti-inflammatory drugs, total energy intake, folate intake, calcium intake, menopause/postmenopausal hormone use status (women only)	26-32 years	Women: 1.55 HR (1.25, 1.94) Men: 1.71 HR (1.19, 2.46)

Bao et al., 2018 (33)	Sweden	3968	Swedish national patient registry and cancer registry	WHO Obesity Definition (≥ 30)	Female: 1676 (42.2%) Male: 2292 (57.8%)	Age, sex, smoking and alcohol consumption		Colon: 1.05 OR (0.48-2.28) Rectum: 0.37 OR (0.09-1.51)
Wong et al., 2019 (34)	Singapore	28191	Singapore cancer registry (SCR)	≥ 27.5	Female	Age at baseline, highest education level, body mass index, race, smoking status	18 years	1.39 HR (1.12 - 1.74)
Bjørge et al., 2019 (35)	Sweden	16931	Swedish cancer registry, cancer registry of Norway, vorarlberg cancer registry	WHO Obesity Definition (≥ 30)	Male: 7253 (42.8%) Female: 9678 (57.2%)	Pack-years, parity, age at first birth, physical activity, education, triglycerides-glucose index	17.6 years (median)	Male: 1.55 HR (1.15 - 2.10) Female: 1.44 HR (1.06 - 1.96)
Nam et al., 2020 (36)	Korea	9959605	Korean national health insurance system (NHIS)	WHO Obesity Category for Asian Individuals (≥ 25)	Male: 5501772 (55.2%) Female: 4457833 (44.8%)	Age, sex, smoking status, alcohol consumption, physical activity, income, hypertension, diabetes mellitus, and dyslipidemia	8.3 years	Male: 1.17 HR (1.15-1.19) Female: 1.14 HR (1.11-1.17)
Li et al., 2022 (24)	Germany	1368; Cases: 747 Controls: 621	Regional hospital patient registry	WHO Obesity Category (≥ 30)	Cases: Male: 425 (57%), Female: 322 (43%) Controls: Male: 345 (56%), Female: 276 (44%)	Age, sex, previous endoscopy, CRC family history, education, ever regular smoking, alcohol consumption, nonsteroidal anti-inflammatory drug use, physical activity, diabetes	N/A	2.06 RR (1.25 - 3.40)
Seo et al., 2023 (37)	Korea	3810334	Korean national health insurance system (NHIS)	WHO Obesity Category for Asian Individuals (≥ 25)	Male: 2321227 (60.9%) Female: 1489107 (39.1%)	Age, sex, smoking, alcohol intake, regular physical activity, economic status, diabetes mellitus, hypertension, dyslipidemia.	9.18 years	Male: 1.11 HR (1.08 - 1.14) Female: 1.04 HR (1.00 - 1.07)

Table. S3. Newcastle-Ottawa quality assessment for cohort studies included in meta-analysis.

Author, year	Selection ^a	Comparability ^b	Exposure/outcome ^c	Overall quality assessment
Wang et al., 2008 (25)	****	*	**	7
Song et al., 2008 (26)	****	*	**	7
Bassett et al., 2010 (27)	***	**	***	8
Oxentenko et al., 2011 (28)	****	*	**	7
Li et al., 2013 (29)	****	**	***	9
Han et al., 2014 (30)	***	*	**	6
Kantor et al., 2016 (31)	****		***	7
Hanyuda et al., 2017 (32)	***	**	***	8
Bao et al., 2018 (33)	***	*	***	7
Wong et al., 2019 (34)	****	**	***	9
Bjørge et al., 2019 (35)	****	**	***	9
Nam et al., 2020 (36)	****	*	**	7
Seo et al., 2023 (37)	****	**	***	9

^a1) **Representativeness of the exposed cohort** a) truly representative of the average obesity concentration in the community ***** b) somewhat representative of the average obesity concentration in the community ***** c) selected group of users eg nurses, volunteers d) no description of the derivation of the cohort 2) **Selection of the non-exposed cohort** a) drawn from the same community as the exposed cohort ***** b) drawn from a different source c) no description of the derivation of the non-exposed cohort 3)

Ascertainment of exposure a) secure record (eg surgical records) ***** b) structured interview ***** c) written self-report d) no description

4) **Demonstration that outcome of interest was not present at start of study** a) yes ***** b) no

^b1) **Comparability of cohorts on the basis of the design or analysis** a) study controls for smoking ***** b) study controls diet *****

^c1) **Assessment of outcome** a) independent blind assessment ***** b) record linkage ***** c) self-report d) no description 2) **Was follow-up long enough for outcomes to occur** a) yes (≥ 8 years) ***** b) no 3) **Adequacy of follow up of cohorts** a) complete follow up - all subjects accounted for ***** b) subjects lost to follow up unlikely to introduce bias - small number lost - $> 7\%$ ***** c) follow up rate $< 80\%$ (select an adequate %) and no description of those lost d) no statement

Table S4. Newcastle-Ottawa quality assessment for case-control studies included in meta-analysis.

Author, year	Selection ^a	Comparability ^b	Exposure/outcome ^c	Overall quality assessment
Nock et al., 2008 (23)	****	**	***	9
Li et al., 2022 (24)	****	**	**	8

^a1) **Is the case definition adequate?** a) yes, with independent validation * b) yes, eg record linkage or based on self-reports c) no description 2) **Representativeness of the cases** a) consecutive or obviously representative series of cases * b) potential for selection biases or not stated 3) **Selection of Controls** a) community controls * b) hospital controls c) no description 4) **Definition of Controls** a) no history of disease (endpoint) * b) no description of source

^b 1) **Comparability of cases and controls on the basis of the design or analysis** a) study controls for smoking * b) study controls for diet *

^c 1) **Ascertainment of exposure** a) secure record (eg surgical records) * b) structured interview where blind to case/control status * c) interview not blinded to case/control status d) written self report or medical record only e) no description 2) **Same method of ascertainment for cases and controls** a) yes * b) no 3) **Non-Response rate** a) same rate for both groups * b) non respondents described c) rate different and no designation

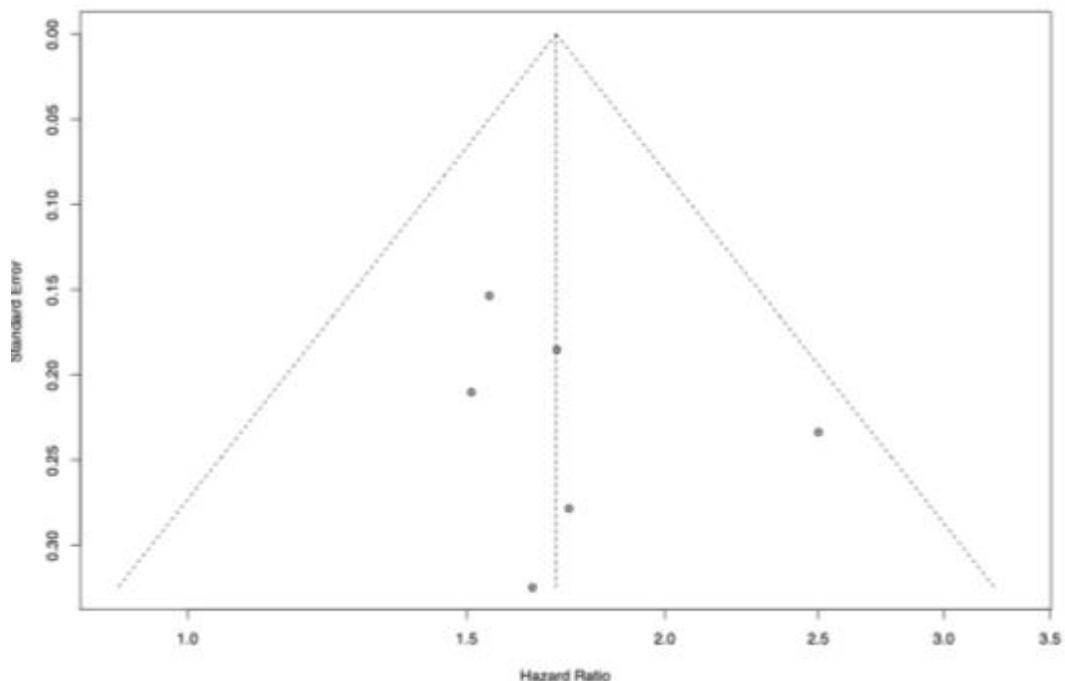


Fig. S1. Funnel plot assessing publication bias for meta-analysis investigating association between obesity in males and CRC

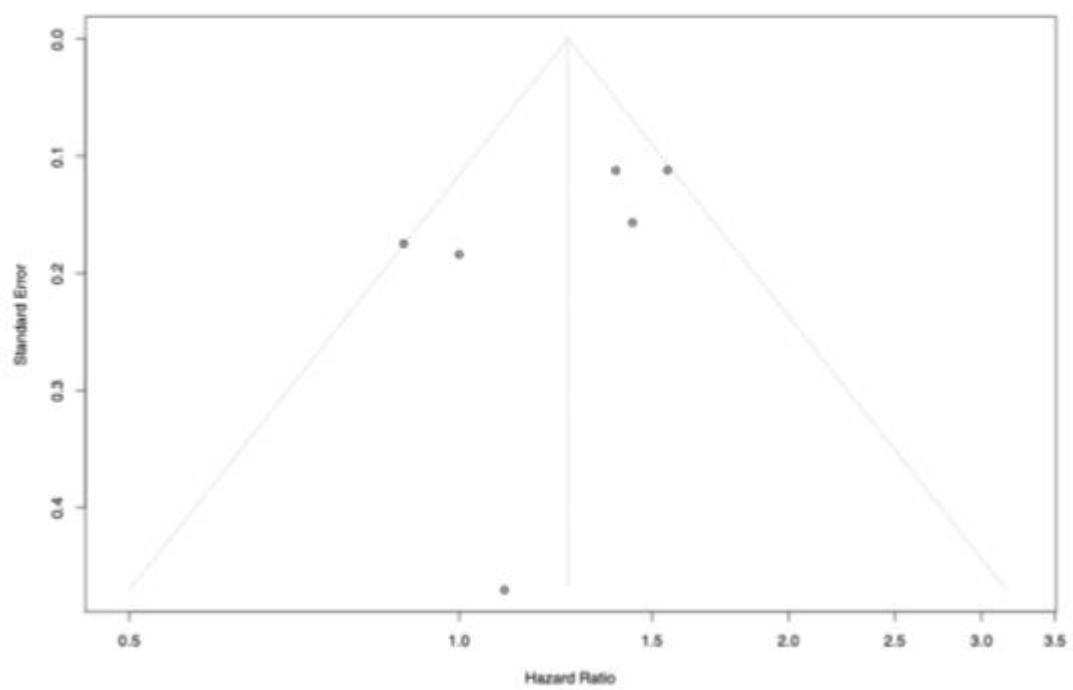


Fig S2. Funnel plot assessing publication bias for meta-analysis investigating association between obesity in females and CRC

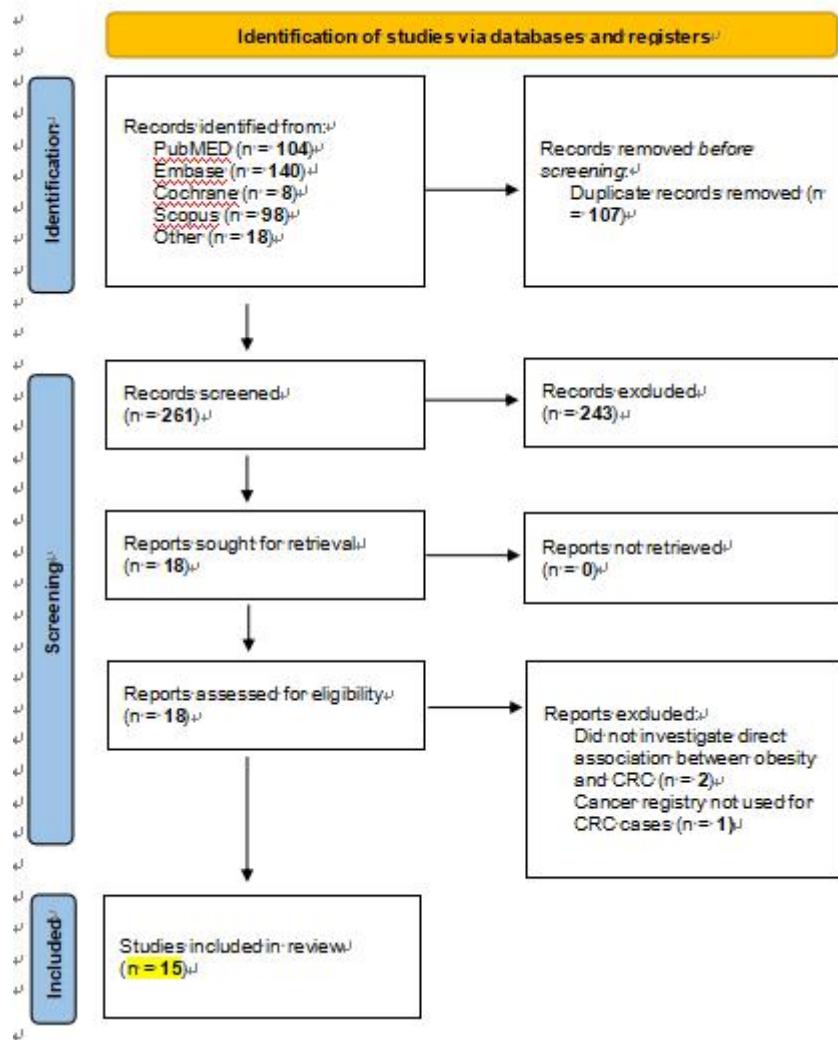


Fig. S3. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram for study selection.