

Dietary intake of vitamin C and gastric cancer: a pooled analysis within the Stomach cancer Pooling (StoP) Project

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Supplementary Table 1. Main characteristics of the studies included in the analysis.

Supplementary Table 2. Study participants' characteristics, by study included in the analysis.

Supplementary Table 3. Results of the interaction analysis between dietary intake of vitamin C and other selected factors.

Supplementary Figure 1. Flowchart describing inclusion of studies and participants.

Supplementary Figure 2. E-value for the point estimate and the upper limit of the 95% confidence interval for the observed association between dietary intake of vitamin C and gastric cancer.

Supplementary Table 1. Main characteristics of the studies included in the analysis.

Study label [ref]	Type of study	Study period	n cases, by quartile (Q) of intake of vitamin C	n controls, by quartile (Q) of intake of vitamin C
Italy 1 [18]	Clinic-based	1997-2007	Q1: 57 Q2: 63 Q3: 63 Q4: 47	Q1: 137 Q2: 137 Q3: 137 Q4: 136
Italy 2 [19]	Community-based	1985-1987	Q1: 335 Q2: 272 Q3: 208 Q4: 201	Q1: 290 Q2: 292 Q3: 289 Q4: 288
Greece [22]	Clinic-based	1981-1984	Q1: 47 Q2: 14 Q3: 16 Q4: 33	Q1: 25 Q2: 25 Q3: 25 Q4: 25
Russia [23]	Clinic-based	1996-1997	Q1: 109 Q2: 118 Q3: 111 Q4: 112	Q1: 153 Q2: 153 Q3: 153 Q4: 152
Iran [27]	Community-based	2005-2007	Q1: 153 Q2: 75 Q3: 32 Q4: 24	Q1: 76 Q2: 76 Q3: 76 Q4: 76
China [25]	Community-based	1991-1993	Q1: 171 Q2: 168 Q3: 173 Q4: 195	Q1: 177 Q2: 176 Q3: 177 Q4: 176
Portugal [24]	Community-based	1999-2006	Q1: 259 Q2: 155 Q3: 144 Q4: 75	Q1: 400 Q2: 400 Q3: 400 Q4: 400
Spain 1 [20]	Community-based	2008-2012	Q1: 94 Q2: 81 Q3: 85 Q4: 79	Q1: 760 Q2: 760 Q3: 760 Q4: 760
Spain 2 [21]	Clinic-based	1995-1999	Q1: 136 Q2: 114 Q3: 62 Q4: 86	Q1: 114 Q2: 114 Q3: 114 Q4: 113
Mexico 1 [29]	Community-based	2004-2005	Q1: 28 Q2: 55 Q3: 77 Q4: 88	Q1: 120 Q2: 119 Q3: 120 Q4: 119
Mexico 2 [30]	Community-based	1989-1990	Q1: 39 Q2: 65 Q3: 49 Q4: 67	Q1: 188 Q2: 188 Q3: 188 Q4: 188
Mexico 3 [31]	Clinic-based	1994-1996	Q1: 71 Q2: 50 Q3: 60 Q4: 53	Q1: 117 Q2: 117 Q3: 117 Q4: 117
Japan 3 [26]	Clinic-based	1998-2002	Q1: 52 Q2: 32 Q3: 28 Q4: 41	Q1: 62 Q2: 82 Q3: 86 Q4: 73
USA [28]	Community-based	1988-1993	Q1: 45 Q2: 39 Q3: 44 Q4: 42	Q1: 126 Q2: 125 Q3: 126 Q4: 125

Supplementary Table 2. Study participants' characteristics, by study included in the analysis.

Characteristics	Study																													
	Italy 1		Italy 2		Greece		Russia		Iran		China		Portugal		Spain 1		Spain 2		Mexico 1		Mexico 2		Mexico 3		Japan		USA			
	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)	Cases, n (%)	Controls, n (%)		
Sex																														
Male	83 (62.2)	286 (52.3)	540 (63.0)	705 (60.8)	57 (51.8)	49 (49.0)	248 (55.1)	293 (48.0)	210 (73.4)	217 (71.4)	453 (63.7)	453 (63.7)	417 (60.3)	783 (47.0)	290 (65.8)	1,892 (55.0)	266 (66.3)	285 (62.6)	134 (54.0)	258 (54.0)	122 (55.5)	296 (39.4)	33 (56.8)	266 (56.8)	108 (70.6)	215 (71.0)	37 (57.1)	284 (56.6)		
Female	87 (37.8)	261 (47.7)	376 (37.0)	454 (39.2)	53 (48.2)	51 (51.0)	202 (44.9)	318 (52.1)	76 (26.6)	87 (28.6)	258 (36.3)	258 (36.3)	275 (39.7)	884 (53.0)	151 (34.2)	1,548 (45.0)	135 (33.7)	170 (37.9)	114 (46.0)	220 (46.0)	88 (44.5)	456 (60.6)	01 (43.2)	202 (43.2)	45 (29.4)	88 (29.0)	73 (42.9)	218 (43.4)		
Age, years																														
≤40	11 (4.8)	28 (5.1)	25 (2.5)	39 (3.4)	7 (6.4)	6 (6.0)	12 (2.7)	61 (10.0)	8 (2.8)	4 (1.3)	49 (6.9)	50 (7.0)	36 (5.2)	154 (9.2)	14 (3.2)	100 (2.9)	10 (2.5)	13 (2.9)	35 (14.1)	64 (13.4)	32 (14.6)	86 (11.4)	80 (12.8)	63 (13.5)	7 (4.6)	18 (5.9)	2 (1.2)	47 (9.4)		
41-50	33 (14.4)	83 (15.2)	90 (8.9)	102 (8.8)	9 (8.2)	19 (19.0)	56 (12.4)	160 (26.2)	16 (5.6)	43 (14.1)	59 (8.3)	62 (8.7)	105 (15.2)	372 (22.3)	34 (7.7)	405 (11.8)	44 (11.0)	53 (11.7)	39 (15.7)	67 (14.0)	40 (18.2)	113 (15.0)	37 (15.8)	73 (15.6)	30 (19.6)	49 (16.2)	7 (4.1)	47 (9.4)		
51-60	58 (25.2)	134 (24.5)	213 (21.0)	240 (20.7)	18 (16.4)	25 (25.0)	109 (24.2)	175 (28.6)	57 (19.9)	77 (25.3)	141 (19.8)	130 (18.3)	130 (18.8)	363 (21.8)	90 (20.4)	652 (19.0)	70 (17.5)	97 (21.3)	55 (22.2)	114 (23.9)	38 (17.3)	182 (24.2)	53 (22.7)	114 (24.4)	44 (28.8)	103 (34.0)	11 (6.5)	53 (10.6)		
61-70	89 (38.7)	210 (38.4)	397 (39.1)	432 (37.3)	41 (37.3)	30 (30.0)	188 (41.8)	158 (25.9)	88 (30.8)	92 (30.3)	271 (38.1)	293 (41.2)	182 (26.3)	437 (26.2)	106 (24.0)	1,174 (34.1)	133 (33.2)	169 (37.1)	75 (30.2)	126 (26.4)	80 (36.4)	214 (28.5)	70 (29.9)	138 (29.5)	70 (45.8)	122 (40.3)	32 (18.8)	90 (17.9)		
>70	39 (17.0)	92 (16.8)	291 (28.6)	346 (29.9)	35 (31.8)	20 (20.0)	85 (18.9)	57 (9.3)	117 (40.9)	88 (29.0)	191 (26.9)	176 (24.8)	239 (34.5)	341 (20.5)	197 (44.7)	1,109 (32.2)	144 (35.9)	123 (27.0)	44 (17.7)	107 (22.4)	30 (13.6)	157 (20.9)	44 (18.8)	80 (17.1)	2 (1.3)	11 (3.6)	118 (69.4)	261 (52.0)		
Missing	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Socioeconomic status																														
Low	95 (41.3)	236 (43.1)	817 (80.4)	797 (68.8)	91 (82.7)	67 (67.0)	27 (6.0)	25 (4.1)	93 (32.5)	69 (22.7)	478 (67.2)	447 (62.9)	552 (79.8)	752 (45.1)	603 (68.7)	1,802 (52.4)	367 (91.5)	418 (91.9)	61 (24.6)	159 (33.3)	48 (21.8)	200 (26.6)	55 (27.8)	149 (31.8)	58 (37.9)	105 (34.7)	17 (10.0)	23 (4.6)		
Intermediate	86 (37.4)	174 (31.8)	167 (16.4)	287 (24.8)	10 (9.1)	6 (6.0)	382 (84.9)	537 (87.9)	159 (55.6)	172 (56.6)	196 (27.6)	228 (32.1)	94 (13.6)	362 (21.7)	91 (20.6)	951 (27.7)	97 (10.7)	683 (19.9)	98 (39.5)	180 (37.7)	37 (35.0)	337 (44.8)	99 (42.3)	205 (43.8)	53 (41.2)	134 (44.2)	112 (65.9)	274 (54.6)		
High	46 (20.0)	133 (24.3)	17 (1.7)	61 (5.3)	9 (8.2)	26 (26.0)	36 (8.0)	42 (6.9)	84 (11.9)	63 (20.7)	33 (4.6)	30 (4.2)	97 (5.4)	550 (33.0)	17 (3.9)	5 (0.0)	1 (0.3)	7 (1.5)	89 (35.0)	139 (29.1)	51 (23.2)	149 (19.8)	55 (27.8)	110 (23.5)	31 (20.3)	62 (20.5)	40 (23.5)	174 (34.7)		
Missing	3 (1.3)	4 (0.7)	15 (1.5)	14 (1.2)	0 (0.0)	1 (1.0)	5 (1.1)	7 (1.2)	0 (0.0)	0 (0.0)	4 (0.6)	6 (0.8)	9 (1.3)	3 (0.2)	0 (0.0)	4 (0.1)	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	44 (20.0)	66 (8.8)	5 (2.1)	4 (0.9)	1 (0.7)	2 (0.7)	1 (0.6)	31 (6.2)		
Body mass index																														
Underweight (<18.5 kg/m ²)	2 (0.9)	13 (2.4)	28 (2.8)	25 (2.2)	2 (1.8)	1 (1.0)	26 (5.8)	10 (1.6)	9 (3.2)	4 (1.3)	0 (0.0)	0 (0.0)	5 (0.4)	16 (1.0)	3 (0.7)	36 (1.1)	29 (7.2)	8 (1.8)	23 (9.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	12 (7.8)	2 (0.7)	3 (1.8)	14 (2.8)
Normal weight (18.5 – 24.9 kg/m ²)	116 (50.4)	236 (43.1)	553 (54.4)	580 (50.0)	50 (45.5)	39 (39.0)	210 (46.7)	189 (30.9)	190 (66.4)	106 (34.9)	3 (0.4)	2 (0.3)	211 (30.5)	515 (30.9)	121 (27.4)	1,105 (32.1)	175 (43.6)	126 (27.7)	131 (52.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	100 (65.4)	202 (66.7)	59 (40.6)	245 (48.8)		
Overweight (25 – 29.9 kg/m ²)	82 (35.7)	223 (40.8)	349 (34.4)	452 (39.0)	38 (34.6)	45 (45.0)	101 (22.4)	194 (31.8)	57 (19.9)	125 (41.1)	44 (6.2)	37 (5.2)	255 (36.9)	726 (43.6)	392 (43.5)	1,279 (37.2)	95 (23.7)	181 (39.8)	73 (29.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	59 (25.5)	97 (32.0)	71 (41.8)	175 (34.9)		
Obese (≥30 kg/m ²)	26 (11.3)	73 (13.4)	86 (8.5)	102 (8.8)	15 (13.6)	14 (14.0)	40 (8.9)	106 (17.4)	18 (6.3)	68 (22.4)	559 (92.7)	669 (94.1)	138 (19.9)	383 (23.0)	98 (22.2)	638 (18.6)	19 (4.7)	81 (17.8)	21 (8.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.3)	2 (0.7)	22 (12.9)	55 (11.0)		
Missing	4 (1.7)	2 (0.4)	0 (0.0)	0 (0.0)	5 (4.6)	1 (1.0)	73 (16.2)	112 (18.3)	5 (0.7)	3 (0.4)	85 (12.3)	27 (1.6)	27 (6.1)	382 (11.1)	27 (6.1)	382 (11.1)	83 (20.7)	59 (13.0)	0 (0.0)	478 (100.0)	220 (100.0)	752 (100.0)	234 (100.0)	468 (100.0)	3 (0.0)	0 (0.0)	5 (2.9)	13 (2.6)		
Tobacco smoking status																														
Never	96 (41.7)	261 (47.7)	359 (35.3)	413 (35.6)	55 (50.0)	49 (49.0)	241 (53.6)	345 (56.5)	172 (60.1)	196 (64.5)	373 (52.5)	415 (58.4)	386 (55.8)	873 (52.4)	84 (41.7)	1,511 (43.9)	165 (41.2)	218 (47.9)	118 (47.6)	232 (48.5)	84 (38.2)	398 (52.9)	33 (56.8)	258 (55.1)	52 (34.0)	148 (48.8)	87 (51.2)	230 (45.8)		
Former	71 (30.9)	163 (29.8)	285 (28.1)	381 (32.9)	14 (12.7)	6 (6.0)	137 (16.2)	87 (14.2)	83 (11.7)	45 (14.8)	135 (19.0)	83 (11.7)	162 (23.4)	376 (22.6)	55 (35.2)	1,216 (35.4)	57 (21.7)	114 (25.1)	110 (44.4)	128 (26.8)	0 (0.0)	0 (0.0)	74 (31.6)	115 (24.6)	46 (30.1)	73 (24.1)	70 (41.2)	189 (37.7)		
Current	60 (26.1)	122 (22.3)	329 (32.4)	335 (28.9)	41 (37.3)	45 (45.0)	131 (29.1)	177 (29.0)	71 (24.8)	63 (20.7)	202 (28.4)	212 (29.8)	121 (17.5)	361 (21.7)	98 (22.2)	664 (19.3)	149 (37.2)	123 (27.0)	37 (6.2)	104 (21.8)	125 (56.8)	340 (45.2)	21 (9.0)	88 (18.8)	52 (34.0)	78 (25.7)	8 (4.7)	63 (12.6)		
Missing	3 (1.3)	1 (0.2)	43 (4.2)	30 (2.6)	0 (0.0)	0 (0.0)	5 (1.1)	2 (0.3)	0 (0.0)	0 (0.0)	1 (0.1)	1 (0.1)	23 (3.3)	57 (3.4)	4 (0.9)	49 (1.4)	0 (0.0)	0 (0.0)	1 (1.9)	14 (2.9)	11 (5.0)	14 (11.9)	5 (2.6)	7 (1.5)	3 (2.0)	4 (1.3)	5 (2.9)	20 (4.0)		
Alcohol drinking status																														
Never	38 (16.5)	125 (22.9)	132 (13.0)	161 (13.9)	27 (24.6)	45 (45.0)	101 (22.4)	166 (27.2)	278 (97.2)	297 (97.7)	438 (61.6)	452 (63.6)	83 (12.0)	266 (16.0)	88 (13.2)	514 (14.9)	135 (33.7)	178 (39.1)	126 (50.8)	302 (63.2)	91 (41.4)	467 (62.1)	112 (47.9)	225 (48.1)	52 (34.0)	89 (29.4)	73 (42.9)	195 (38.8)		
Ever	192 (83.5)	422 (77.2)	884 (87.0)	998 (86.1)	83 (75.5)	55 (55.0)	344 (76.4)	440 (72.0)	8 (2.8)	7 (2.3)	273 (38.4)	255 (35.9)	586 (84.7)	1,344 (80.6)	271 (61.5)	2,262 (65.8)	266 (66.3)	277 (60.9)	122 (49.2)	176 (36.8)	129 (58.6)	285 (37.9)	22 (52.1)	243 (51.9)	101 (66.0)	214 (70.6)	66 (56.5)	299 (59.6)		
Missing	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (1.1)	5 (0.8)	0 (0.0)	0 (0.0)	0 (0.0)	4 (0.6)	23 (3.3)	57 (3.4)	112 (25.4)	664 (19.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)	8 (1.6)		
Subsite																														
Cardia	10 (4.4)	29 (6.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	92 (20.4)	0 (0.0)	55 (22.7)	0 (0.0)	0 (0.0)	78 (11.3)	0 (0.0)	0 (0.0)	95 (21.5)	0 (0.0)	31 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	21 (13.7)	84 (20.0)	0 (0.0)	0 (0.0)		
Noncardia	92 (40.0)	247 (93.2)	0 (0.0)	0 (0.0)	90 (81.8)	0 (0.0)	201 (44.7)	0 (0.0)	221 (77.3)	0 (0.0)	0 (0.0)	546 (78.9)	0 (0.0)	0 (0.0)	332 (75.3)	261 (65.1)	61 (65.1)	0 (0.0)	111 (44.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	126 (82.4)	07 (62.9)	0 (0.0)	0 (0.0)		
Missing	128 (55.7)	0 (0.0)	0 (0.0)	0 (0.0)	20 (18.2)	0 (0.0)	157 (34.9)	0 (0.0)	0 (0.0)	0 (0.0)	711 (100.0)	0 (0.0)	68 (9.8)	0 (0.0)	14 (3.2)	0 (0.0)	109 (27.2)	2 (0.8)	0 (0.0)	220 (100.0)	0 (0.0)	0 (0.0)	234 (100.0)	5 (3.9)	29 (17.1)	0 (0.0)	0 (0.0)			
Histological type																														
Intestinal	33 (14.4)	0 (0.0)	510 (50.2)	0 (0.0)	0 (0.0)	0 (0.0)	121 (26.9)	0 (0.0)	148 (51.8)	0 (0.0)	0 (0.0)	286 (41.3)	0 (0.0)	0 (0.0)	168 (38.1)	0 (0.0)	243 (60.6)	0 (0.0)	92 (37.1)	0 (0.0)	0 (0.0)	0 (0.0)	80 (34.2)	0 (0.0)	0 (0.0)	89 (52.4)	0 (0.0)	0 (0.0)		
Diffuse	57 (24.8)	216 (21.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	119 (26.4)	0 (0.0)	88 (23.8)	0 (0.0)	0 (0.0)	146 (21.1)	0 (0.0)	0 (0.0)	103 (24.3)	0 (0.0)	109 (27.2)	0 (0.0)	155 (62.5											

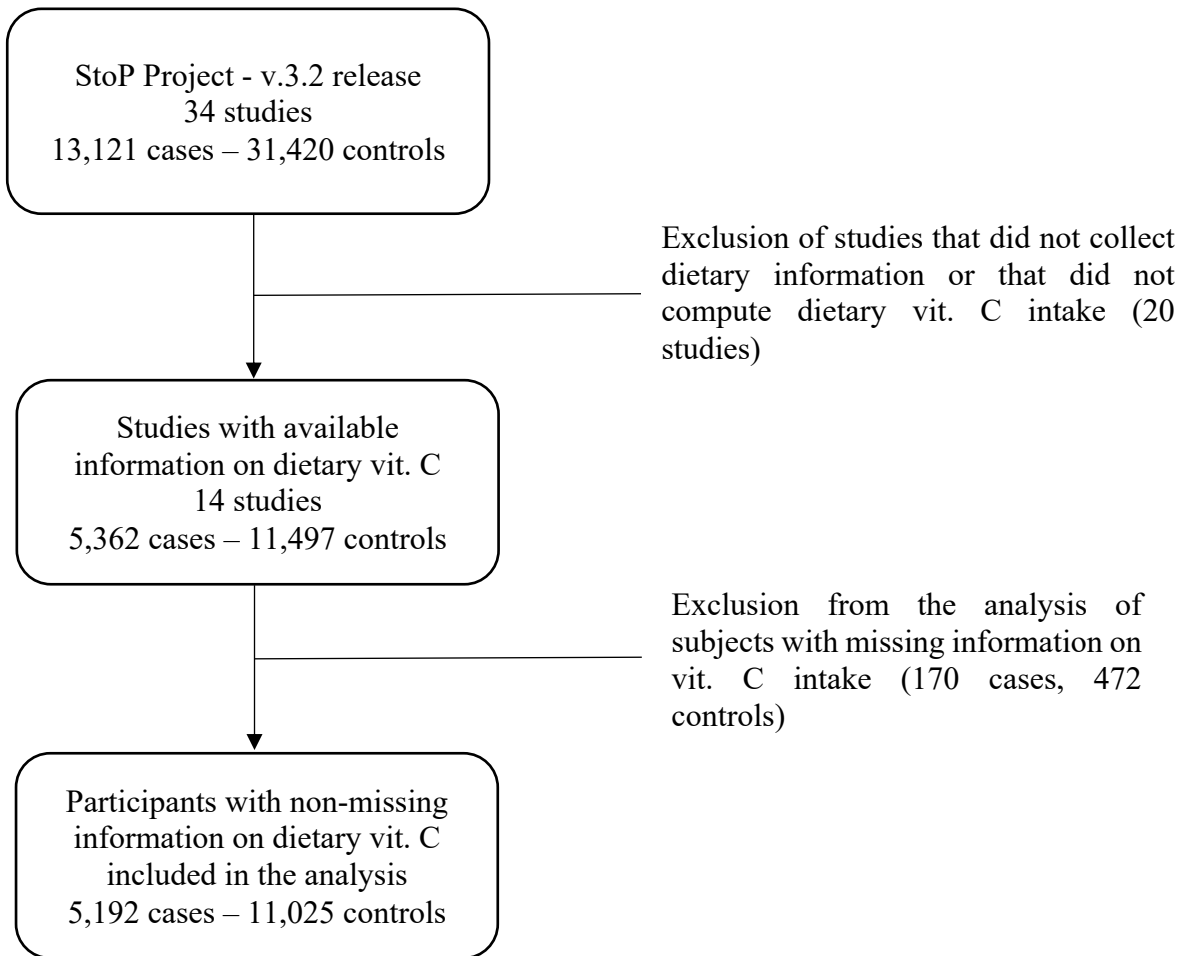
Supplementary Table 3. Results of the interaction analysis between dietary intake of vitamin C and other selected factors.

Stratum	Intake of vitamin C		RERI (95% CI)	AP (95% CI)
	Higher than median OR (95% CI)	Lower than median OR (95% CI)		
Age			-0.01 (-0.19, 0.16)	-0.01 (-0.14, 0.12)
≤60 years	1.00 (ref)	1.13 (0.99, 1.29)		
>60 years	1.25 (1.12, 1.40)	1.37 (1.20, 1.55)		
Sex			0.07 (-0.09, 0.24)	0.05 (-0.07, 0.18)
Female	1.00 (ref)	1.07 (0.94, 1.22)		
Male	1.17 (1.03, 1.32)	1.31 (1.15, 1.49)		
Socioeconomic status			0.22 (-0.03, 0.47)	0.11 (-0.02, 0.24)
High	1.00 (ref)	1.04 (0.83, 1.29)		
Low/intermediate	1.76 (1.50, 2.06)	2.02 (1.70, 2.39)		
Tobacco smoking status			-0.10 (-0.28, 0.07)	-0.10 (-0.27, 0.07)
Non-current	1.00 (ref)	1.13 (1.01, 1.26)		
Current	1.01 (0.89, 1.15)	1.04 (0.91, 1.19)		
Alcohol drinking status			0.02 (-0.16, 0.19)	0.01 (-0.12, 0.15)
Never	1.00 (ref)	1.11 (0.96, 1.28)		
Ever	1.12 (0.99, 1.28)	1.25 (1.08, 1.43)		
BMI			0.35 (0.12, 0.58)	0.19 (0.08, 0.31)
Overweight/obese	1.00 (ref)	1.10 (0.97, 1.24)		
Normal weight	1.35 (1.19, 1.53)	1.80 (1.56, 2.06)		
<i>H. pylori</i> seropositivity			0.14 (-0.19, 0.46)	0.11 (-0.15, 0.36)
Negative	1.00 (ref)	1.10 (0.82, 1.48)		

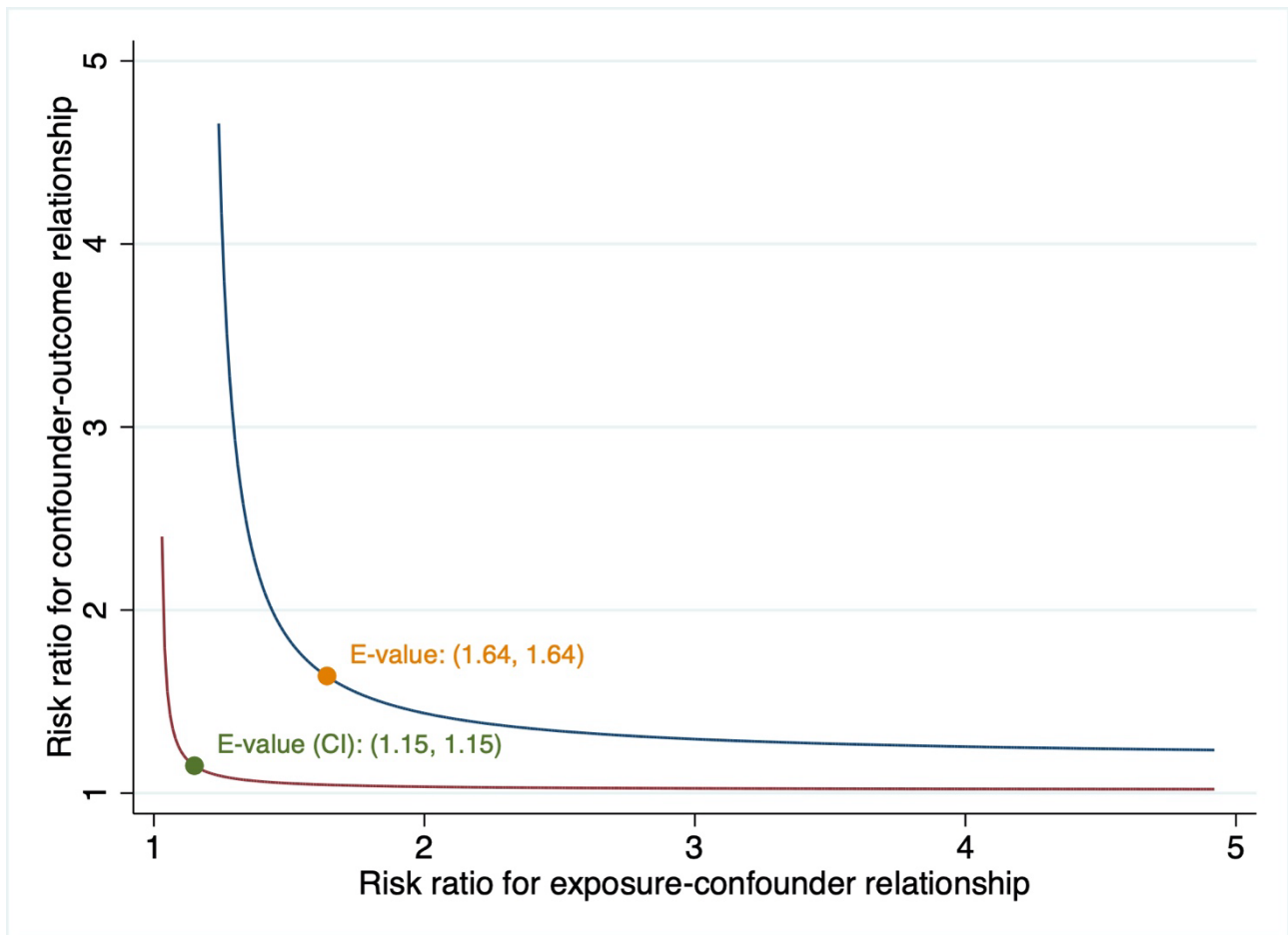
Positive	1.08 (0.86, 1.37)	1.32 (1.02, 1.71)		
Intake of fruit and vegetables			0.13 (-0.10, 0.37)	0.09 (-0.07, 0.25)
High	1.00 (ref)	1.15 (0.96, 1.36)		
Intermediate/low	1.22 (1.09, 1.37)	1.50 (1.36, 1.65)		
Intake of salt			0.16 (-0.17, 0.49)	0.09 (-0.10, 0.29)
Low	1.00 (ref)	1.28 (1.12, 1.47)		
Intermediate/high	1.24 (1.03, 1.50)	1.68 (1.39, 2.03)		

RERI: relative excess risk due to interaction, AP: attributable proportion due to interaction, OR: odds ratio, CI: confidence interval, BMI: body mass index

Supplementary Figure 1. Flowchart describing inclusion of studies and participants.



Supplementary Figure 2. E-value for the point estimate and the upper limit of the 95% confidence interval for the observed association between dietary intake of vitamin C and gastric cancer.



Computation of the E-value was based on estimates from Model 2 (adjusted for sex [male, female], age [≤ 40 years, 41-50 years, 51-60 years, 61-70 years, > 70 years, missing], socioeconomic status [low, intermediate, high, missing], tobacco smoking status [never, former, current, missing], alcohol drinking status [never, ever, missing], body mass index [underweight, normal weight, overweight, obese, missing], intake of fruit and vegetables [low, intermediate, high, missing], total energy intake [continuous]).