

**S3 Table.** The association between metabolically healthy phenotypes (defined by WHR and WHtR categories) and GI cancer

|                      | No.    | GI cancer |                     | Esophageal cancer |                     | Gastric cancer |                     | Colorectal cancer |                     | Biliary tract cancer |                     | Liver cancer |                     | Pancreatic cancer |                     |
|----------------------|--------|-----------|---------------------|-------------------|---------------------|----------------|---------------------|-------------------|---------------------|----------------------|---------------------|--------------|---------------------|-------------------|---------------------|
|                      |        | Case      | Multiple-adjusted   | Case              | Multiple-adjusted   | Case           | Multiple-adjusted   | Case              | Multiple-adjusted   | Case                 | Multiple-adjusted   | Case         | Multiple-adjusted   | Case              | Multiple-adjusted   |
| <b>WHR category</b>  |        |           |                     |                   |                     |                |                     |                   |                     |                      |                     |              |                     |                   |                     |
| MHNW                 | 16,645 | 212       | Ref                 | 14                | Ref                 | 42             | Ref                 | 75                | Ref                 | 10                   | Ref                 | 58           | Ref                 | 13                | Ref                 |
| MUNW                 | 40,852 | 807       | 1.18<br>(1.02-1.38) | 86                | 2.51<br>(1.42-4.43) | 182            | 1.69<br>(1.20-2.37) | 289               | 1.51<br>(1.17-1.95) | 22                   | 1.76<br>(0.36-1.62) | 170          | 1.21<br>(0.90-1.64) | 58                | 1.71<br>(0.93-3.14) |
| MHO                  | 10,501 | 162       | 1.06<br>(0.87-1.31) | 13                | 1.75<br>(0.82-3.73) | 36             | 1.41<br>(0.90-2.20) | 46                | 1.00<br>(0.69-1.45) | 4                    | 0.61<br>(0.19-1.96) | 42           | 1.55<br>(1.06-2.26) | 11                | 1.36<br>(0.61-3.04) |
| MUO                  | 46,997 | 1,130     | 1.38<br>(1.19-1.61) | 125               | 3.74<br>(2.13-6.54) | 232            | 1.98<br>(1.41-2.77) | 21                | 2.01<br>(1.57-2.59) | 39                   | 1.22<br>(0.60-2.49) | 231          | 1.57<br>(1.17-2.11) | 82                | 2.20<br>(1.21-3.99) |
| <b>WHtR category</b> |        |           |                     |                   |                     |                |                     |                   |                     |                      |                     |              |                     |                   |                     |
| MHNW                 | 15,224 | 161       | Ref                 | 14                | Ref                 | 35             | Ref                 | 49                | Ref                 | 6                    | Ref                 | 45           | Ref                 | 12                | Ref                 |
| MUNW                 | 27,899 | 556       | 1.46<br>(1.23-1.75) | 75                | 2.79<br>(1.57-4.95) | 124            | 1.83<br>(1.25-2.67) | 181               | 1.94<br>(1.41-2.67) | 15                   | 1.16<br>(0.45-3.02) | 121          | 1.48<br>(1.05-2.10) | 40                | 1.69<br>(0.88-3.25) |
| MHO                  | 11,922 | 213       | 1.32<br>(1.07-1.62) | 13                | 1.31<br>(0.61-2.79) | 43             | 1.53<br>(0.98-2.40) | 72                | 1.87<br>(1.30-2.70) | 8                    | 1.52<br>(0.52-4.41) | 65           | 1.96<br>(1.34-2.88) | 12                | 1.22<br>(0.55-2.73) |
| MUO                  | 59,950 | 1,381     | 1.46<br>(1.24-1.72) | 136               | 2.74<br>(1.56-4.81) | 290            | 2.05<br>(1.43-2.95) | 529               | 2.75<br>(2.04-3.71) | 46                   | 1.62<br>(0.68-3.90) | 280          | 1.72<br>(1.25-2.38) | 100               | 2.00<br>(1.09-3.70) |

Multivariable model adjusted for age, sex, educational level, drinking, smoking, physical exercise, family history of cancer, salt intake, high-sensitive C-reactive protein, and alanine transaminase. Model for colorectal cancer was additionally adjusted for high fat diet. Model for biliary tract cancer was additionally adjusted for gallstone. Model for liver cancer was additionally adjusted for hepatitis B virus surface antigen. Model for pancreatic cancer was additionally adjusted for history of chronic pancreatitis. WHR was calculated as the ratio of WC and hip circumference and central obesity was defined as  $\text{WHR} \geq 0.8$  for female and  $\geq 0.9$  for male. WHtR was calculated as the ratio of WC and height and central obesity was defined as  $\text{WHtR} \geq 0.5$ . GI, gastrointestinal; MHNW, metabolic healthy normal-weight; MHO, metabolic healthy obesity; MUNW, metabolic unhealthy normal-weight; MUO, metabolic unhealthy obesity; WHR, waist-hip ratio; WHtR, waist-to-height ratio.