**Supplementary materials:** International trends in esophageal squamous cell carcinoma and adenocarcinoma incidence

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**Supplementary materials:**

**Detailed data source and methods**

**Supplementary table 1** Average annual population, cases, proportion of total cases, age-standardized incidence rate (ASR) and male to female rate ratio (M:F) by country and esophageal cancer subtype 2003-2012.

**Supplementary figure 1** Age-specific incidence rates of esophageal squamous cell carcinoma (A) and adenocarcinoma (B) by year of birth (cohort) and year of diagnosis (period) for men in all 28 populations. Rates are displayed on a semi-log plot.

**Detailed data source and methods**

**Data source**

New cases of invasive esophageal cancer (International Statistical Classification of Diseases and Related Health Problems, 10th revision [ICD-10]: C15) by calendar year, sex, five-year age group and histological subtype were extracted from the *Cancer Incidence in Five Continents Plus* (CI5plus) database of population-based cancer registry data.1 Cases were categorized into four histology groups according to the International Classification of Diseases for Oncology, Third edition (ICD-O-3), morphology codes: SCC (8050-8078, 8083-8084); AC (8140-8141, 8143-8145, 8190-8231, 8260-8265, 8310, 8401, 8480-8490, 8550-8552, 8570-8574, 8576); sarcoma, other specified carcinoma, other specified malignant neoplasm and unspecified carcinoma (8010-8011,8800-8811, 8830, 8840-8921, 8990-8991, 9040-9044, 9120-9133, 9150, 9540-9581); and unspecified malignant neoplasm (8000-8005).

Population-based cancer registries with 15 or more consecutive years of data were included, and multiple subnational cancer registries in the same countries were aggregated to obtain a national proxy. We excluded countries with population coverage of less than 500,000 people, countries which recorded less than five cases of either SCC or AC annually, countries with more than 30% of esophageal cancer cases assigned unspecified histology unless more than 90% of the remaining cases were specified as either SCC or AC per year in the most recent 10 years. Using these criteria, we included a total of 70 out of 104 registries to examine incidence patterns in 28 populations in 27 countries; we kept United States (US) blacks and whites as separate populations, as well as the nations in the United Kingdom (England, Northern Ireland and Scotland [no data for Wales]). Esophageal cancer incidence in these populations is presented in supplementary table 1 for years 2003-2012.

**Statistical analysis**

Age-standardized incidence rates (ASR) per 100,000 person-years were calculated by sex and subtype for all ages combined using the 1960 Segi–Doll world standard population.2 Male to female (M:F) incidence rate ratios were calculated using sex-specific ASRs. We calculated average annual percent change (AAPC) and corresponding 95% confidence intervals (95% CI) for the 10 most recent years of data using Joinpoint regression.3 This approach uses the Monte Carlo Permutation to test for a significant change in trend; AAPC was calculated as the weighted average of the annual percent changes from the joinpoint model of the time period selected. The minimum and maximum numbers of joinpoints were set to 0 and 3, respectively.

We assessed long-term trends by birth cohorts, which indicate changes in the prevalence of exposure to risk factors across successive generations, and by period of diagnosis, an indicator of changes linked to diagnostic methods or classification of disease that influence multiple age groups at a point in time.4 Birth cohorts were obtained by subtracting the midpoint of the five-year age-group from the midpoint of the five-year period of diagnosis, assuming incidence rates were constant within five-year age groups. Data management and plotting were carried out using the *Rcan*5 package in R version 3.5.1.6

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