Changing trends in the prevalence of *H. pylori* infection in Japan (1908-2003): a systematic review and meta-regression analysis of 170,000 individuals

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BACKGROUND

- Gastric cancer burden remains high in Japan, approximately 50,000 deaths/year in Japan (2nd leading cause of cancer deaths).
- Evidence supports a central role for *H. pylori* in the development of upper-gastrointestinal diseases, including peptic ulcer and noncardia gastric cancer.
- Cross-sectional studies have suggested that the prevalence of *H. pylori* infection increases with age, while the whole picture remains obscure.
- We systematically reviewed the existing literature that presented estimates of the prevalence of *H. pylori* infection in the Japanese population.
- The obejectives are:

1. to derive a robust prevalence estimate of *H. pylori* infection by birth year;
2. to clarify whether *H. pylori* infection exhibits a birth-cohort pattern.

DATA SOURCES AND SEARCH STRATEGY

- The PRISMA statement for preferred reporting of systematic reviews and meta-analyses was used as a guide to conduct this study. (Fig.1. Flowchart of Study Selection)
- **PubMed** ("Helicobacter"[Mesh] OR "Helicobacter pylori"[title/abstract]) AND ("Prevalence"[Mesh] OR "prevalence"[title/abstract]) AND ("Japan"[Mesh] OR "Japan"[title/abstract] OR "Japanese"[title/abstract])
- **EMBASE** ("prevalence"/exp OR prevalence:ab, ti) AND ("Japan"/exp OR "Japan: ab, ti" OR "Japanese: ab, ti") AND ("helicobacter"/exp OR "helicobacter pylori": ab, ti) AND (humans)/lim.
- We also scrutinised the reference lists, and searched for unpublished data by contacting the head of known ongoing study projects in Japan.
- The risk-of-bias assessment was independently performed by two authors (LY and WC) using the Joanna Briggs Institute Prevalence Critical Appraisal Tool

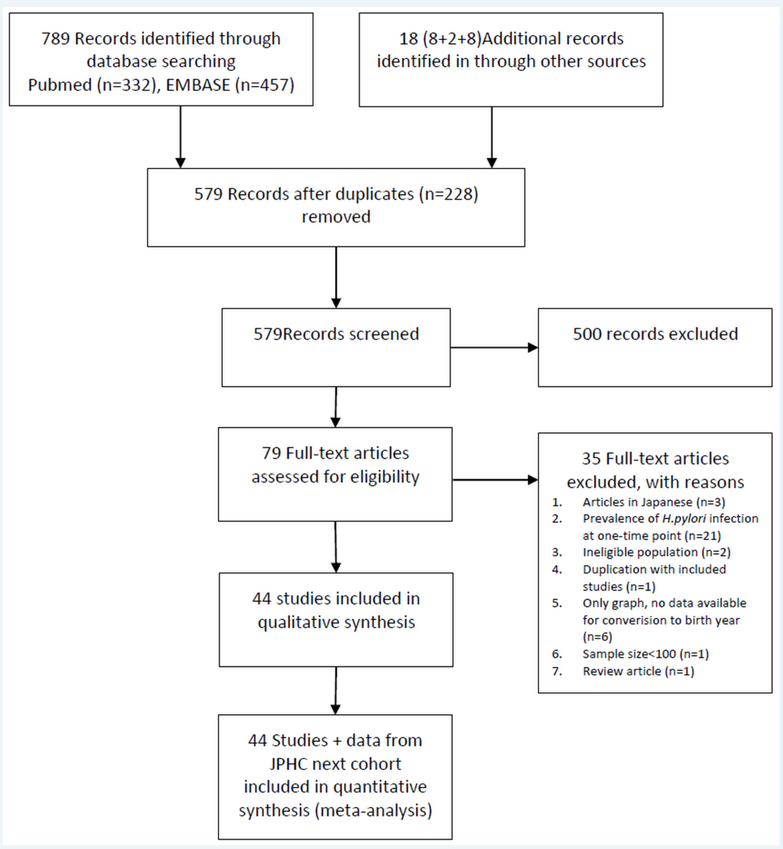

Figure 1: Flowchart of Study Selection

STATISTICAL ANALYSIS (1)

- Prevalence by birth year were extracted from 45 studies (273 data points).
- Penalized cubic spline was used to model the prevalence as a function of birth year in the framework of generalized additive mixed model (GAMM) implemented in the `mgcv` package in R.

STATISTICAL ANALYSIS (2)

- Pre-specified explanatory variables included in the meta-regression were as follows:
  Study ID, birth year, population source (community-based or clinical-based), diagnostic testing (serological test, or others; others: urinary assays, salivary assays, stool antigen tests, and gastric biopsy), types of ELISA kits for measuring *H. pylori* positivity (antigen derived from domestic or foreign strains), and data collection period (prior to the year 2000, or later than 2000), with **study ID as a random effect** and **other variables as fixed effects**.
- Observations weighted by the inverse of the sum of the within-study variance and the residual between-study variance using the `meta` package.

RESULTS

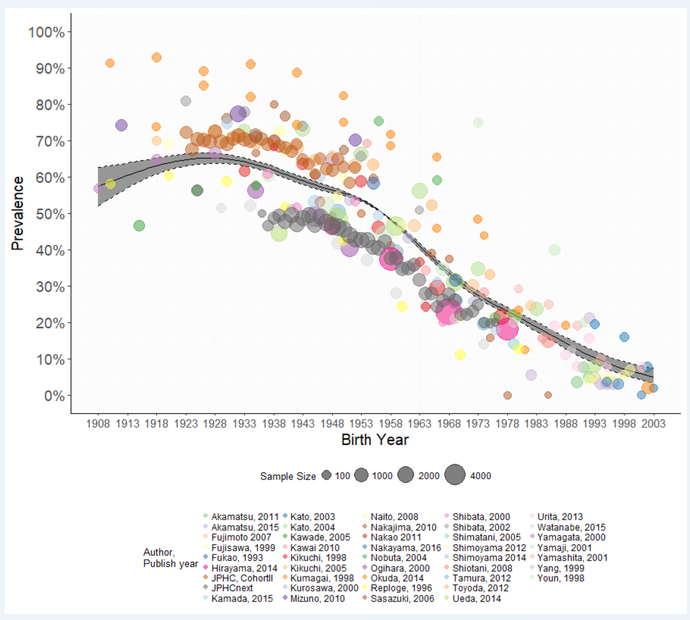

Figure 2: Multivariable adjusted prevalence of H. pylori infection in Japanese by birth year.

Take-home message

- `R bookdownplus` is an extension of `bookdown` for academic and literal writing, especially for reproducible reports.
- `R bookdownplus` is still being developed. Feel free to join me either in contributing templates to **my Github repo** [a], or in writing the tutorial of R bookdownplus (Zhao, 2017).

[a] https://github.com/pzhaonet/bookdownplus

COI Declaration

Bibliography

Zhao, P (2017). *R bookdownplus: Enhancement of bookdown for writing varied types of books and documents*.