29715-Response Letter

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Title: Bayesian adjustment of gastric cancer mortality rate in the presence of misclassification

Ranking of cause of death and of cancer related death in Iran:

Cancer is the third cause of death (after cardiovascular disease and injuries) in Iran. Gastric cancer is the seventh cause of all deaths in Iran and is the first cause of cancer death in Iranian men and the second cause of cancer death (after breast cancer) in Iranian women.[It is added and highlighted to manuscript in Introduction part]

Problems of actual death registry system in Iran:

In Iran, mortality data among the four vital events (births, marriages, divorces and deaths) that were registered by the National Organization for Civil Registration (NOCR) was the worst in quality. There was some progress in registering deaths but some problems like delayed registration and inaccurate recording of causes of death remained Until 2002, that Ministry of health and medical education Deputy of Research and Technology, started up a system to record the causes of deaths. This system did not allow to delayed deaths registration, but the causes of death were susceptible to information bias due to misclassification. Although the majority of deaths get a death certificate completed by a physician، but still, a number of causes of death in the process of completing death certificates and the coding of underlying cause of death based on standardized international rules, remains challenging. According to the Iranian death registry, about 15% to 20% of death statistics are recorded in misclassified categories such as cardiopulmonary arrest, old age without dementia, septicemia, unknown, cancer without mention of details, and other ill-defined conditions. The most probable garbage code that can be registered instead of deaths due to a special cancer is cancer without

mentioning the type. [It is added and highlighted to manuscript in Introduction part]

Explanation of the Bayesian Approach:

Bayesian method is one of the statistical methods that assign probabilities or distributions to events (as rain tomorrow) or parameters (as a population mean) based on previous experience or an expert's idea before experimentation and data collection and applying the Bayes' theorem to revise the probabilities and distributions after obtaining experimental data. In summary this method makes the possibility of combining the prior information about the subset of the parameters with the observed data to achieve a posterior distribution which will be the basis of inferences to correct the statistics. [It is added and highlighted in the last paragraph of the introduction and in terminology part of the comment. The used Bayesian method is also explained in method part.]

Spelling correction:

The Bayesian word that was spelled wrongly in the figure legends is corrected.

Importance of correcting for misclassification and advantage of using Bayesian method:

 Gastric cancer is the first cause of cancer death in Iranian population. 3-7% of gastric cancer death equates to about 150 to 350 cases per year (out of a total of 5000-6000 cases per year) that is a non-ignorable under-reporting. Since registered mortality data is used for health policy making and estimating the burden of disease, after correcting the misclassification in death registry system, more precise estimates of death rates and cause specific burden of disease will be achieved. Consequently there will be a better planning for disease control and prevention.

Reviewing the medical records or verbal autopsy as a practical solution for misclassification is time consuming. By using the Bayesian method, it is not needed to valid the data for estimating the rate of misclassification. For implementing the Bayesian

method only prior information about the misclassification rate is enough. So Bayesian method is a rapid and cost-effective way for correcting the existed misclassification.