Limitations of the winter/summer ratio (and its variants) as a seasonality index

Context

The material which follows relates specifically to the winter/summer ratio presented in section 3.2.2 of Chapter 3 in Roland Rau's electronic book Seasonality in Human Mortality: A Demographic Approach.

Background

While, given its relative simplicity, the winter/summer ratio is the simplest seasonality index provided in the above chapter, and as such the more appropriate for an undergraduate medical student to use within the context of a short research project, some limitations of this index ought to be acknowledged. These limitations are provided in detail below for your consideration.

1. It disregards length of month

Disregarding length of month makes the index a little crude, as these lengths vary from one month to another and in the case of February, from one year to another. Notice, for example, that the suicide incidence data in Figure 3.4 of the chapter seems to fluctuate quite consistently according to length of month. While it is relatively simple to correct for these problems through appropriate weighting, even this correction would have its limitations if the underlying assumption is that incidence is consistent across individual days of the month. It is therefore better to have daily incidence!

2. It disregards population fluctuations

It is possible that the event under consideration (e.g. death or incidence of pneumonia) is being studied in relation to:

a) a rapidly fluctuating population (such as in a refugee camp) where number of individuals at risk (for a range of reasons) and age are not stable

or

b) a population in which insect populations fluctuate seasonally, thus influencing susceptibility to disease or death.

Admittedly, it is often the case that authors of publications neglect to offer the necessary values of person-years at risk to provide for a more accurate measure of incidence which takes the population characteristics into consideration. However, these values do help when endeavouring to compare seasonality across populations and time periods more accurately.

3. It disregards incidence for the 2nd and 4th quarters of the year

The loss of data in determining the winter/summer ratio necessitates that the confidence interval for the seasonality index is about 40% wider than that obtained by other methods.

This limits the precision that can be associated with this seasonality index when making inferences from your sample to a parent population.

4. It may not be capturing winter and summer differences

It is debatable whether the 3-month periods chosen for equation (3.1) are the most appropriate ones for capturing winter-summer differences. You might like to consider whether it would be useful to use December to February and June to August instead, while recognizing the possible practical drawback that the former spans two calendar years.

A little trivia may be helpful here by way of indicating that even the above suggestion is not set in stone. The Welsh word for July, Gorffennaf, is derived from gorffen yr haf, and literally means 'end of summer'!

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