SHORT REPORT

A direct approach to control short term population dynamics in time series studies

Stefano Zauli Sajani, Fabiana Scotto, Paolo Lauriola

Background: Short term population dynamics is an important issue in several epidemiological studies. Usually, calendar time or dummy variables are used to control indirectly for this confounding. This study tested a direct method.

Methods: The study compared as proxy variables of population dynamics the summer 2003 data of cooking gas consumptions, solid urban waste production, and television access for the municipality of Bologna (Italy).

Results: Solid urban waste production and television access data showed similar trends. Considerably different were the >65 year olds estimates with respect to total population based on television access.

Conclusions: Television access data are probably the best indicator in the estimates of population dynamics in large or densely populated areas, especially because of the possibility of stratifications with respect to age.

METHODS

We compared the summer 2003 data of cooking gas consumptions, solid urban waste production, and television access referred to the municipality of Bologna, a city of 371,000 inhabitants in the north east of Italy. Daily data of cooking gas consumption and solid urban waste production were given by Hera, the main service factory of the area. Even if waste composition changes during the year, it is nearly uniform during summer season. Daily television access was defined as the number of persons who switched television on at least once during a day. Data were derived from AUDITEL (AGB Italia), the Italian television access monitoring system. The system is based on the remote control of a panel of persons of different age, sex, social, and economic status: this permits stratified estimates, first of all by age. The 2003 water and electricity household consumption in the study area were unavailable.

RESULTS

Figure 1 shows the comparison between the summer 2003 trends of seven day moving averages of cooking gas consumption, solid urban waste productions, and television access. Each variable was “normalised” dividing daily values by the average of the first week’s data. The best agreements were found between solid urban waste production and television access. The minimum was on 15 August. In this period solid urban waste productions and television contacts were between 50% and 60% of the usual value. A similar trend appeared in cooking gas consumption, with an even more pronounced minimum (nearly 40% of the usual value). Figure 2 compares the estimates of the total population and the >65 year olds based on television data. The >65 population in August was about 70%–80% of the >65 residents; this percentage was 40%–45% for <65 years old.

Figure 1 Seven day moving averages of solid urban waste production, cooking gas consumption, and television access during summer 2003. The data are “normalised” dividing daily values by the average of the first week’s data.
The analysis of regional data that take into account both rural and urban data showed even more noticeable differences between population estimates in the different age stratifications.

**DISCUSSION**

Even though we had no reference value of the number of people really present, we can argue that the consistency in the trends between solid urban waste production and television access enables these variables to be considered as good indicators of the total population present during the summer season. Cooking gas consumption could also be a useful indicator but these data are affected by the error connected with the estimate of the cooking part of the total gas consumption. The cooking part was calculated from the total gas consumption by applying a monthly coefficient given by the service factory. Household electricity and water consumptions, not available for this study, are thought to be given by the service factory.

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We tested a direct method based on the analysis of water and cooking gas consumptions, solid urban waste production, and television access. Television access data seem the most appropriate indicator of the present population.

**What is already known on this subject**

- Short term population dynamics is an important issue in several epidemiological studies
- Calendar time or dummy variables are used to control indirectly for this confounding.

**What this study adds**

We tested a direct method based on the analysis of water and cooking gas consumptions, solid urban waste production, and television access. Television access data seem the most appropriate indicator of the present population.

**Policy implications**

Present population estimates permit better quantification of the expected health outcomes and a proper organisation of health services and watch/warning systems.

**REFERENCES**

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