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Decline of live births in Japan 9 months after Fukushima

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In December 2011, 9 months after the nuclear disaster at Fukushima Daiichi, a significant decline in live births occurred relative to the trend of the years 2006 to 2011 in Japan (P=0.007) and, simultaneously, in Fukushima prefecture (p=0.0001). A similar effect was observed in several European countries in February 1987, about 9 months after the Chernobyl accident. The decline in live births is limited to the months of December 2011 and February 1987. This distinct effect may indicate increased spontaneous abortions caused by the initial radiation exposure from the nuclear accidents.

Background

A recent study [1] found a significant drop of the number of live births in December 2011 in Japan and Fukushima prefecture. A similar decline in live births was found in Bavaria in February 1987, 9 months after the Chernobyl accident. To ascertain that this was not a chance result, live birth data from several other European countries were analyzed.

Data and Methods

Monthly data from several European countries were collected: West Germany (former FRG), Austria, Italy, Croatia, Hungary, Poland, and Finland. The data from the city of Kiev were provided by MV Golubchikov via email contact.

The temporal trend of live births was analyzed using a Poisson regression (R statistical package, function glm (), family = quasipoisson). The annual course of live births was modeled with a dummy variable for each month of the year. To determine the magnitude of the effect in February 1987, an additional dummy variable was introduced.

Results

Table 1 gives the percent decrease of live births in December 2011 and the numbers of missing births in Japan (P=0.007) and Fukushima Prefecture (P=0.0001). The trend of the data from Fukushima and the regression line are shown in Figure 1, upper left image. The image below shows the deviation from the expected trend, in units of standard deviations.

Table 2 contains the corresponding results for the decline in live births in several European countries in February 1987 and in the city of Kiev in Ukraine. An 11.5% decline (P<0.001) in live births was found in Southern Bavaria, the German region with highest fallout from the Chernobyl accident. In Northern Bavaria, which was much less contaminated, the deficit of live births was not significant (-5.2%, P = 0.160). Significant effects were also detected in Italy (-6.8%, P = 0.017), Croatia (-8.2%, P = 0.007) and Poland (4.6%, P = 0.050). In West Germany (former FRG), Austria, Hungary and Finland, the results were only significant at the 10% level (P <0.10).

The greatest decrease is observed in the city of Kiev, Ukraine (see Figure 1, right side) where the effect already starts in January and continues until mid 1987. The birth deficit in January through March 1987 is highly significant (-27.3%, P <0.0001, 2484 missing births).

Table 1: Birth deficit in December 2011 in Japan and Fukushima Prefecture

Country/region	relative decrease	missing births	P value
Japan	4.7%	4362	0.0072
Fukushima Pref.	15.1%	209	0.0001

Table 2: Birth deficit in February 1987 in various countries / regions

Country/region	relative decrease	missing births	P value
Bavaria	8.6%	839	0.0091
Southern Bavaria	11.5%	647	0.0009
Northern Bavaria	5.2%	212	0.1595
West Germany	5.0%	2539	0.0711
Austria	4.3%	299	0.0643
Italy	6.8%	2723	0.0170
Croatia	8.2%	385	0.0073
Hungary	4.2%	417	0.1000
Poland (Feb1987)	4.6%	2295	0.0500
Poland (Jan-March)	4.9%	7803	0.0004
Finland	5.2%	245	0.0848
Kiev (Feb1987)	28.7%	817	<0.0001
Kiev (Jan-March)	27.3	2484	<0.0001

Figure 2 shows the deviations between observed and expected numbers of live births (standardized residuals) after Chernobyl in Southern Bavaria, Poland and Croatia. For comparison, the residuals for Japan after Fukushima are also shown.

Discussion

As can be seen from Figures 1 and 2, the decline in live births is limited to a single month, except from Kiev (Fig.1) and Poland (Fig.2) where 3 months were affected (January through March 1987). If induced abortions were responsible for the effect, one would expect a decline already before February 1987 / December 2011. One might argue that fathering a child was avoided following a nuclear accident. But this is not likely to affect the birth rate in just one month. Thus, an increase of spontaneous abortions caused by radiation exposure remains the most plausible explanation of the observed drop in live births 9 months after the accidents.

1. Körblein A. Säuglingssterblichkeit in Japan nach Fukushima. Strahlentelex (2012) 622-623:12-14. http://www.strahlentelex.de/Stx_12_622-623_S12-14.pdf

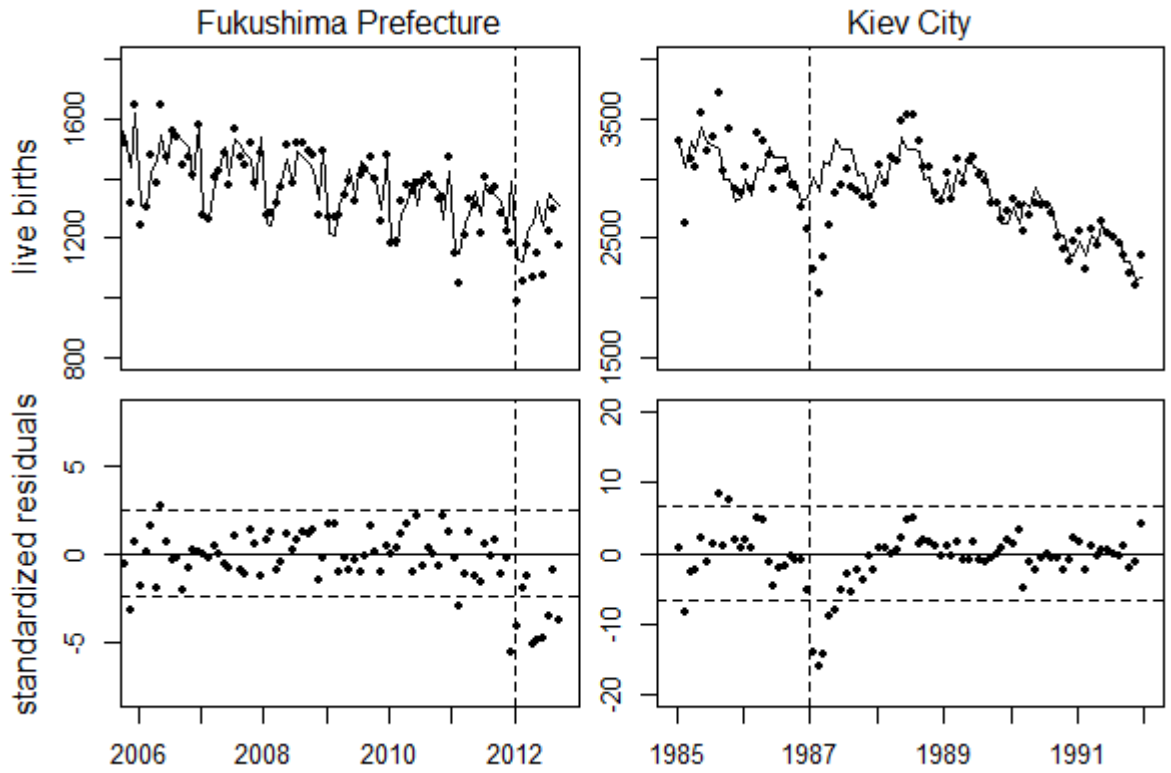

Figure 1: Monthly live births in Fukushima Prefecture (left) and in the city of Kiev (right). The upper images show the trend of the data and the regression line, the images below show the deviations of the data from the expected trend, in units of standard deviations (standardized residuals).

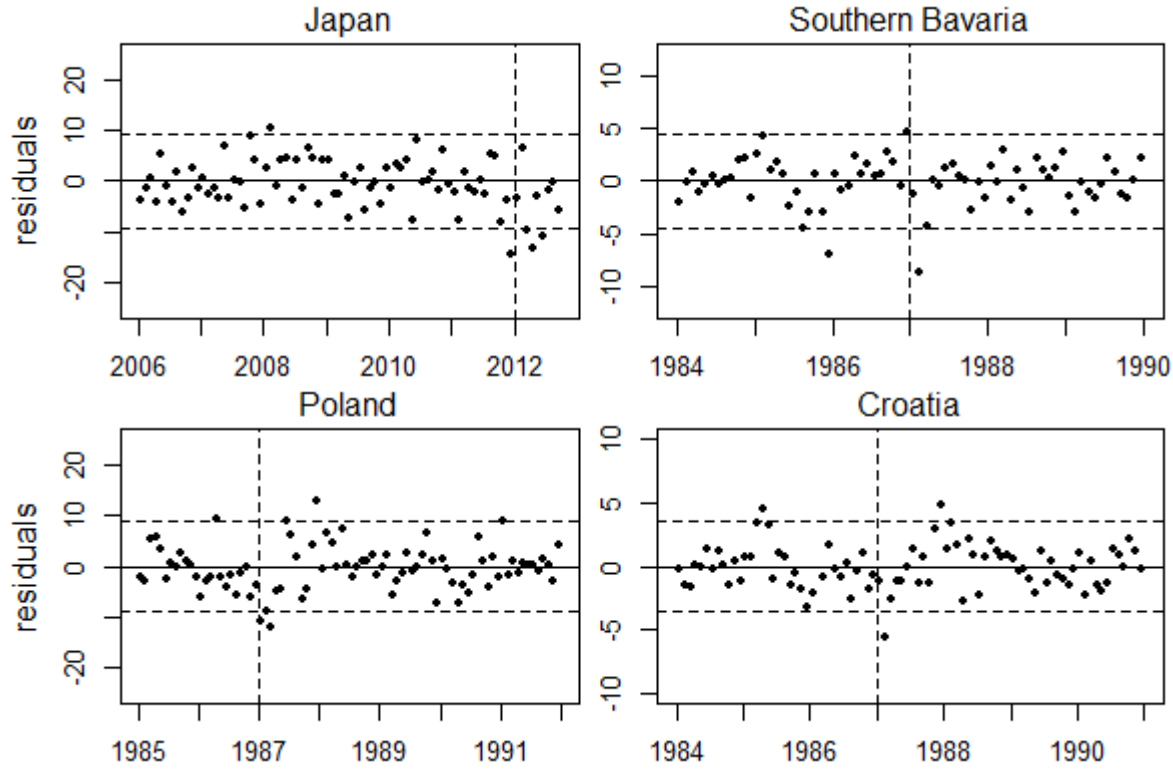

Figure 2: Deviations of the monthly numbers of live births from the expected trend, in units of standard deviations (standardized residuals) in Japan, 2006-2012, and in 3 European countries before and after Chernobyl.