Consistency of cause-specific mortality data at subnational level: a comparative analysis of France, Germany and Russia

Inna Danilova [1,2], Vladimir M. Shkolnikov[1,2], Pavel Grigoriev[1], Dmitri Jdanov[1,2], France Meslé[3], Jacques Vallin[3]

[1] Max Planck Institute for Demographic Research, Rostock (Germany)
[2] National Research University Higher School of Economics, Moscow (Russia)
[3] Institut national d'études démographiques, Paris (France)

INTRODUCTION

Causes of Death (CoD) Statistics is an important data source which provides crucial information for identifying public health problems and developing health care strategies.

The uniformity of cause-of-death coding practices across subnational entities within a single country is one of the important criteria to evaluate the quality of cause-specific mortality statistics.

DATA

CAUSES OF DEATH : 70 groups of causes of death based on ICD-10.

TIME PERIOD: 5-year period from 2005 to 2009.

TERRITORIAL COVERAGE: Areas of France, Germany and Russia on the first (top) level of administrative division. To eliminate the potential bias caused by small number of events **only those areas with an average annual population over 1 mln.** were included into the analysis.

CODING SYSTEMS

FRANCE

Centralized coding – all death certificates are coded by the French Epidemiological Center for the Medical Causes of Death (CépiDc).

The automated coding system which is used to assist to choose the UCD in particular was implemented in 2000.

GERMANY

Coding is **centralized at the level of Federal States** (Ländern). In 2007 the implementation of the automated coding system was initiated and is still ongoing **(automated coding was used very rarely before 2012**). **Now coding is performed partly manually and partly with the assistance of the coding software**. Federal States are free to decide if and in which cases the coding software should be applied.

RUSSIA

Coding is **decentralized.** Medical practitioners who certify the death are at the same time responsible for choosing the UCD and coding it in accordance with ICD rules.

Automated coding systems are in use in some regions. The automatization of the coding process is not centralized at the federal level.

METHODS

The cause-specific share of the all-cause age-standardized death rate was used as an indicator of cause-specific mortality prevalence:

$$S_{r,c} = \frac{SDR_{r,c}}{SDR_r} \cdot 100\% \quad ,$$

where $SDR_{r,c}$ is the age-standardized death rate for cause *c* in region *r* in 2005-2009, SDR_r is the all-cause age-standardized death rate in region *r* in 2005-2009.

For each possible combination region/cause we have calculated the deviation from the cross-regional mean (period average):

$$V_{r,c} = \sum \frac{|S_{r,c} - \overline{S_{\bullet,c}}|}{\overline{S_{\bullet,c}}} \cdot 100\% \quad ,$$

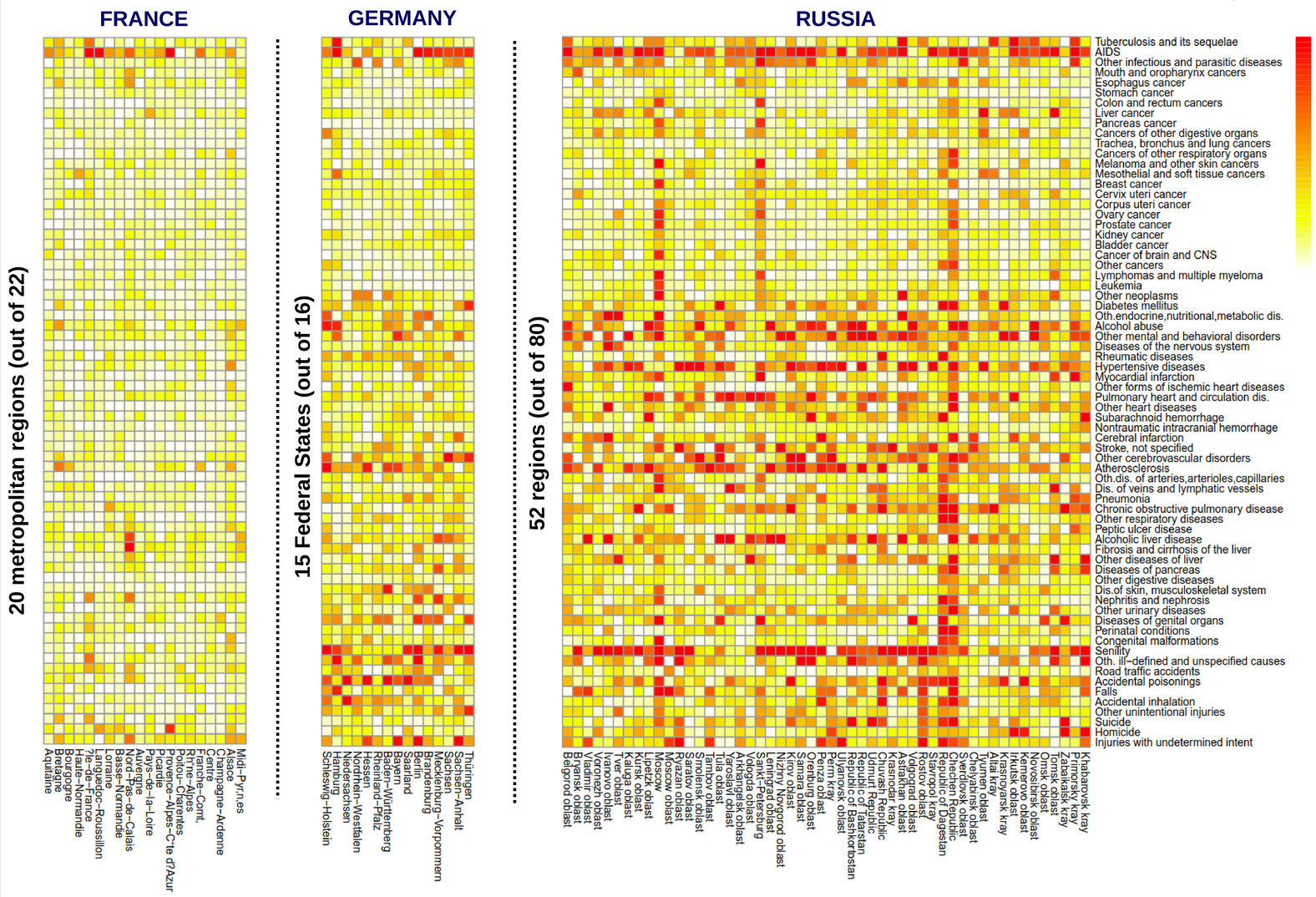
$$1 \le r \le \text{number of regions under study}, 1 \le c \le 70$$

with $\overline{S_{\bullet,c}}$ as the mean of regional $S_{r,c}$.

A visualization of the matrices **V** is presented in **Figure 1.**

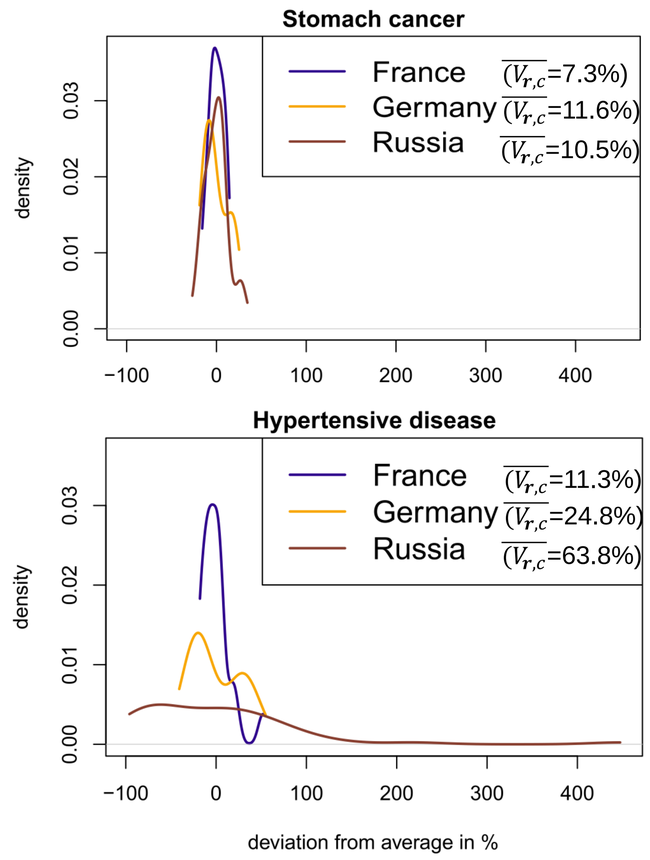
RESULTS

Figure 1. Inter-regional variability in CoD. *The rows correspond to CoD and the column represent regions. The cells are colored according to $V_{r,c}$ values.*



The colour of the heatmaps' rows gives a first idea of the variability of propensity of certain CoD within a country.

e.g. V_r values for ***Stomach cancer*** are low for all heatmaps; V_r values for **Hypertensive disease** are low for the French heatmap, higher for the German heatmap and very high for the Russian heatmap.



CONCLUSION

1. The centralized and automated coding system provides **France with an advantage in terms of comparability** of CoD statistics across its subnational entities.**Russia has the highest number of CoDs with suspiciously high variability** indicating dissimilarity of coding practices at subnational level. **Germany takes up an intermediate position** between France and Russia.
2. The highest variability at subnational level in Gemany and Russia is observed for **AIDS, ill-defined causes, injuries with undetermined intent, atherosclerosis, other cerebrovascular disorders, and accidental poisonings**. In addition, Russia experiences very high variability for **alcohol abuse, other mental disorders, hypertensive diseases, pulmonary heart and circulation diseases, unspecified stroke, chronic obstructive pulmonary diseases, and alcoholic liver diseases.**
3. The vertical patterns on the **Russian** heatmap revial a few **regions which have the most peculiar CoD mortality structures**. These regions are **the cities of Moscow and Saint-Petersburg as well as the republics of Chechnya and Dagestan**. No vertical patterns are noticeable on the French and German heatmaps.