



Road traffic fatalities in Arkhangelsk, Russia in 2005–2010: Reliability of police and healthcare data

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ARTICLE INFO

Article history:

Received 15 February 2012

Received in revised form

26 November 2012

Accepted 19 December 2012

Keywords:

Traffic accidents

Mortality

Reliability

Police data

Healthcare data

Russia

ABSTRACT

Purpose: To estimate and compare reliability of traffic mortality data of the police and the healthcare sector in Arkhangelsk, Russia.

Methods: The study matched traffic mortality data of the police and the regional healthcare statistics centre for the period from 2005 to 2010. Individual investigations of unmatched cases were performed, and the underlying causes of the non-matches were established. The obtained distribution of non-matches by causes served as basis for estimating the true numbers of traffic fatalities in the two sources, in appliance with corresponding fatality definitions and registration rules. A data accuracy index (DAI) was calculated for each source by using an adapted version of the formula for calculating accuracy of a diagnostic test. This was used as a measure for data reliability. Time trends in annual DAIs were estimated for each source by χ^2 -test for linear trend.

Results: During the 6-year period, the police and the healthcare statistics centre registered 217 and 237 traffic fatalities in Arkhangelsk, respectively. Matching of data from the two sources resulted in 162 matched cases, 55 unmatched cases in the police data, and 75 unmatched cases in the healthcare data. More than a half (56%) of the non-matches were attributed to incompatibility of the definitions in the two data registration systems; 39% were attributed to failures in the healthcare data. Other non-matches were due to scarce identifying information (2%) or were not classifiable (2%). None of the non-matches were clearly attributable to failures in the police data. The 6-year DAI was 98% for the police data and 80% for the healthcare data. The DAI for the police data was stable over 2005–2010 (ranging from 96% to 100%). The DAI for the healthcare data increased from 66% in 2005 to 98% in 2010 ($P_{\text{trend}} < 0.001$).

Conclusion: The findings suggest that traffic mortality data of the police were more reliable, compared to the healthcare data. However, reliability of the healthcare data was improving during the study period.

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1. Introduction

Russia has the second highest road traffic mortality (25.2 per 100,000 population) in the WHO European region (World Health Organization, 2009a). However, there is an acknowledged concern that reliability deficits of national data on traffic fatalities may lead to biased mortality estimates and threaten the validity of the local road safety assessments and international comparisons (Elvik and

Mysen, 1999; World Health Organization, 2004, 2009a,b; Derriks and Mak, 2007; Bhalla et al., 2009).

Traffic mortality rates for Russia are based on the data collected by the State Traffic Safety Inspectorate of the Ministry of Internal Affairs (Government of the Russian Federation, 2009; World Health Organization, 2009a,b), later called the *police*. In this respect, it is essential to determine whether the traffic mortality data of the police are reliable. Matching the data on traffic fatalities of the police with those collected by the health sector is a common way to assess the completeness and reliability of police reports (Razzak and Luby, 1998; Elvik and Mysen, 1999; Morrison and Stone, 2000; Rosman, 2001; Meuleners et al., 2006; Derriks and Mak, 2007; Petridou et al., 2009; Bhalla et al., 2010; Lateef, 2010; Hu et al., 2011). However, linkage and comparison of data from these two

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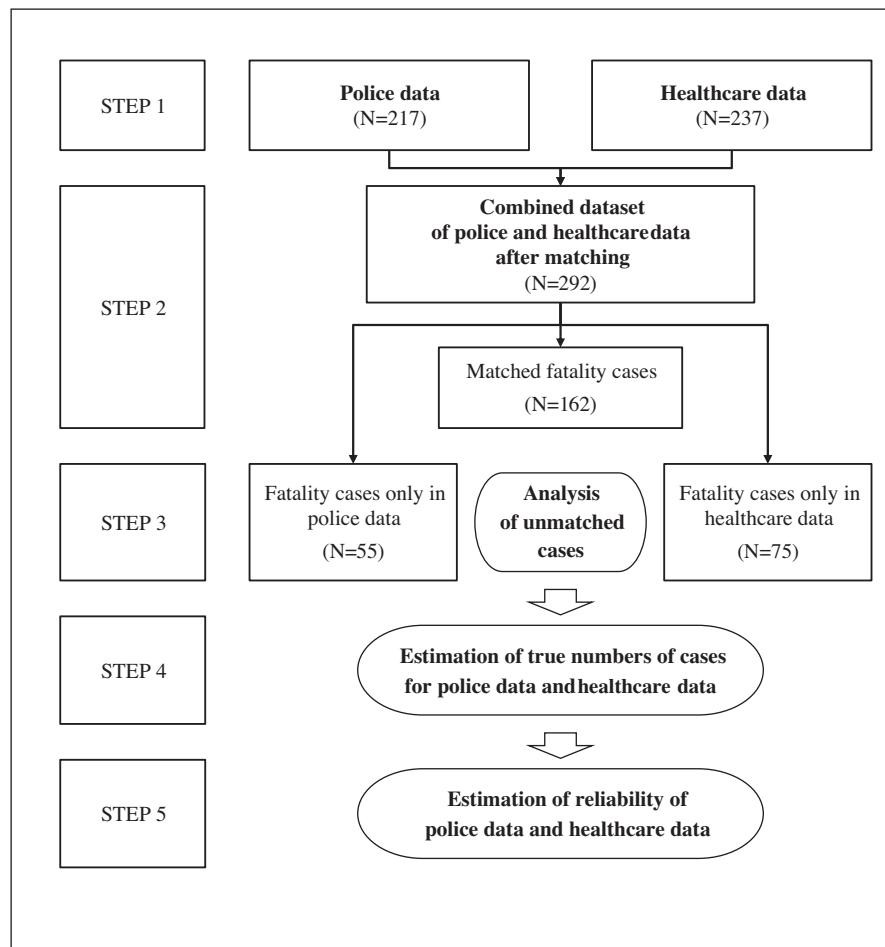


Fig. 1. Steps of management and analysis of Arkhangelsk traffic mortality data for 2005–2010.

sources can be complicated by existing differences in systems of case accounting, non-corresponding definitions, and registration errors (Aptel et al., 1999; Morrison and Stone, 2000; Clark, 2004; Derriks and Mak, 2007; Lujic et al., 2008; Lyons et al., 2008; Petridou et al., 2009; Hu et al., 2011).

The purpose of this paper is to investigate and compare the reliability of police and healthcare traffic mortality data in a Russian urban area by matching fatality cases from the two sources and analysing the causes of inconsistencies.

2. Materials and methods

2.1. Study design and site

This is a reliability study of traffic mortality data performed in Arkhangelsk, a city in the Northwestern Russia with a population of 355,556 on 1 January 2011.

2.2. Data sources and description

There are two key sources of traffic mortality data for the study site – the police and the Regional Medical Informational Analytic Centre, later called the *healthcare statistics centre*.

The Arkhangelsk police have a computerized database of traffic accidents (crashes) with fatal and non-fatal injuries that occur in the Arkhangelsk region. The data is fed into the database from standardized police accident report forms that contain information about accident time, site, circumstances, involved vehicles,

personal and demographic data for the individuals involved and their health outcomes (Kudryavtsev et al., 2012a). According to the definition adopted by the police in 2009, traffic fatality is a fatal injury resulting from a traffic accident and causing death within 30 days (Government of the Russian Federation, 2009). Previously, a seven-day fatality definition was used by the police. The police registration of traffic fatalities is *linked to places and dates of accidents*.

The police database was the source of data on all traffic fatalities that had occurred in Arkhangelsk and were registered by the police over 2005–2010. For each fatality, the data variables include date of birth, gender, place of residence, date of the accident (injury), type of accident, type of motor vehicle used, road user type and related traffic violations.

The Arkhangelsk regional healthcare statistics centre follows the national regulations concerning medical data collection. Analogue centres exist in all the other regions of Russia. The centre routinely receives and accounts standardized medical reports from hospitals and other healthcare institutions (general practitioners, primary health care units, out-patient clinics, emergency ambulance services, morgues) on all cases of fatalities, diseases, and injuries in the residential population of the region and among temporary visitors. Before 2009, the data on fatalities originated only from death certificates, and is also supplied by reports from hospitals thereafter (Ministry of Health and Social Development of the Russian Federation, 2009). Causes of deaths in both these original sources are coded using the *International Classification of Diseases, 10th revision* (ICD-10). The data are fed into the regional mortality register and used for mortality reports. Registration of traffic fatalities in

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