

Cancer incidence and mortality in the industrial city of Sumgayit, Azerbaijan

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Background: The city of Sumgayit, Azerbaijan, was founded in 1949, a centrepiece of Soviet industrial production. During peak production, more than 40 factories were actively producing a diverse array of industrial products, including synthetic rubber, chlorine, aluminium and detergents. The primary goal of Soviet central planners was maximizing low-cost production, which came at the expense of environmental and occupational health and safety. Consequently, factory workers and residents of the city were exposed to a combination of high-level occupational and environmental pollution for several decades. Residents of Sumgayit have long-standing fears that their health has been compromised by these exposures.

Objective: This study is a collaborative effort between the United Nations Development Programme (UNDP), the World Health Organization (WHO) European Region, the Azerbaijan Republic Ministry of Health (MoH), and the University of Alberta (UofA) to evaluate the perceived negative health impacts of long-term occupational and environmental pollution.

Methods: Cancer was selected as the health outcome because of known carcinogenic exposures present in Sumgayit industry, its usefulness in studying long-term exposure effects, and access to population-level cancer data from the MoH. Cancer incidence and mortality rates, through the period 1980-2000, were compared between Sumgayit and several other regions of Azerbaijan, and selected international comparisons were made. Confounding lifestyle factors were controlled through the conduct of an interviewer-administered questionnaire in each of the study regions, assessing smoking history, alcohol consumption, dietary factors, and family history of cancer. Several cancer sites were selected for study by frequency and etiology: larynx, lung, urinary bladder, female breast, and all sites combined. Because of data quality and completeness issues, some analyses were restricted to certain subsets of the selected data.

Results: For both males and females, age-standardized incidence rates in Azerbaijan were found to be unexpectedly low, approximately one-third that of rates in Canada. Crude mortality rates also show similar patterns with respect to international data. Cancer rates in Sumgayit are considerably higher than national averages and rates in other selected regions of Azerbaijan. Standardized Morbidity Ratios (SMRs) between Sumgayit and national averages range from 1.20 (95% CI 1.04-1.39) for breast cancer, to 1.38 (95% CI 1.04-1.82) for laryngeal cancer, 1.47 (95% CI 1.40-1.55) for all cancer sites combined, 1.61 (95% CI 1.40-1.85) for lung cancer, and a high of 2.36 (95% CI 1.84-3.01) for bladder cancer. These results are consistent with more rigorous Poisson regression analysis. Dose-response effects were observed with selected lesser-exposed comparison regions in Azerbaijan.

Conclusions: One possible reason for the disparity between Azerbaijan and Canada is poor diagnosis and case reporting in Azerbaijan. Evidence supporting this claim is the

dramatic decrease in recorded cancer rates during the early 1990s when the newly independent Azeri health care system was severely strained. Because the same stresses likely would have been uniformly distributed throughout Azerbaijan, internal comparisons were conducted. They demonstrated that Sumgayit, associated with the highest levels of pollution in Azerbaijan, experienced higher levels of both cancer morbidity and mortality. Because certain cancers are so elevated, case-control studies could be helpful to elucidate causation.