# Trends in heart failure diagnosis for women and men in urban and rural settings in Ontario

Heart failure remains a significant cause of death and disability for women and men. It is estimated that 1 in 5 individuals will be diagnosed with heart failure in their lifetime, with an average survival of approximately 5 years. Previous studies have reported important differences between the sexes with respect to the diagnosis and outcomes of heart failure patients. Women and men have differences in the type of heart failure they are diagnosed with, and there are also important differences in the treatments that they receive and their long-term outcome. Previous research has also suggested that there are differences in outcomes between those that live in urban vs rural settings. This includes differences in access to care, medication use and clinical outcomes for patients with cardiac disease. It is not known whether these differences are present in non-hospitalized patients with heart failure in Ontario, and whether these differences may be affected by sex.

We studied 36, 175 non-hospitalized patients with a new diagnosis of heart failure in Eastern Ontario from 1994-2013. Our primary goal was to identify changes in one-year mortality over time, and to determine if sex or location of residence (urban vs. rural) were related to mortality.

This study identified that there were decreases in the new diagnosis of heart failure over this time period. This decrease in incidence was seen in both women and men and in patients living in either rural or urban settings. The incidence of heart failure was consistently higher in the rural setting when compared to urban living.  Mortality from heart failure decreased over time for both men and women. In the urban settings, mortality from heart failure was similar for men and women. In the rural settings, mortality was significantly greater for men compared to women at all time points studied. There were also differences in the characteristics between urban and rural patients. Modern rural patients tended to be younger, and have more risk factors such as atrial fibrillation, coronary artery disease, valve disease, chronic obstructive bronchitis and stroke. We also wanted to look at changes over time and compared to cohorts to study: a “historical” cohort from 1994-1998 and a more “modern” cohort between 2009-2013. Interestingly, the lower risk of mortality for women compared to men was only seen in the historical cohort.

Our research suggests that there has been declines in the incidence of heart failure in both urban and rural settings in Eastern Ontario over time. However, the incidence of heart failure remained greater for men compared to women in both geographic settings over time. We have also identified that the mortality related to heart failure has also decreased over time in both geographic settings. Interestingly, in the rural setting, mortality for men was greater than women over the time period studied. This data points to important declines in both the incidence and mortality risk associated with heart failure. This may be due to increased awareness and diagnostic testing for heart failure, as well as increased availabilities of medical treatments for heart failure patients. These findings are not able to determine exactly why rural men have increased mortality risk compared to rural

women, however this may be due to differences in baseline risk factors. It is important to note that the burden of risk factors have changed over time, with increases in many chronic diseases that are associated with worse clinical outcomes. Our findings suggest the need for further research to study the impact of sex and geography in heart failure outcomes and reduce the gap in outcomes between these groups. This understanding can help to optimize the delivery of care for patients with heart failure and other risk factors in both the rural and urban settings.

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## Publication

Sex-Specific Trends in Incidence and Mortality for Urban and Rural Ambulatory Patients with Heart Failure in Eastern Ontario from 1994 to 2013
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