Case 14: Rural Residence and Associated Health Disparities: The Case of Chatham-Kent

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CASE 14

Rural Residence and Associated Health Disparities: The Case of Chatham-Kent

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Gerald McKinley, PhD (Assistant Professor, Western University)

Today’s generation is likely the first to be less healthy and die sooner than their parents’ generation (Heart & Stroke, 2017). This statement should activate the critical and analytical parts of one’s thinking to ask: “Are certain populations more affected than others?”; “What are the social, ethical, medical, and economical implications?”; and ultimately; “Why?” To evaluate a population’s health requires an understanding of the population itself. These factors are contemplated daily by public health epidemiologists and professionals alike, including Nancy Del, Chatham-Kent Public Health Epidemiologist.

Nancy has been tasked with evaluating the wellbeing of Chatham-Kent residents with respect to the burden of chronic disease. Specifically, her research is to focus on the implications that rural residence places upon a population’s health. To do this, she decides to use an epidemiological approach to demonstrate and highlight the disparities experienced by the region of Chatham-Kent. The generated information will then be presented to the Board of Health for approval and subsequently used to help teams within the Health Unit prioritize, plan, and implement programs and services.

BACKGROUND

Using an epidemiological approach to answer some of public health’s most relevant problems is essential. Place of residence is an integral determinant to one’s health. Research demonstrates that rural areas experience higher prevalence and incidences of chronic diseases and higher proportions of chronic disease-related risk factors than their urban counterparts (Hartley, 2004). Chronic diseases commonly prevalent in rural areas include cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes (Eberhardt & Pamuk, 2004). Chronic disease-related risk factors commonly prevalent in rural areas include smoking, overweight and obesity, low fruit and vegetable consumption, and physical inactivity (Caldwell, Kraehling, Kaptur, & Huff, 2015).

Hypothesizing that rural areas experience disproportionate health disparities, compared to the rest of Ontario, requires a mechanism of evidence. Based on previous findings of health disparities in rural populations, the epidemiological approach provides this mechanism. Through quantifying chronic diseases, chronic disease-related burdens, and chronic disease-related risk factors, and comparing rates among different populations, program planning aimed at improving the health of rural residents can be effectively informed.

1 Although varying definitions exist to describe rural residence, the most consistent definition states that any region with less than a population of 1000 or a density of 400/km² is considered a rural area (Statistics Canada, 2015).
CHATHAM-KENT
The municipality of Chatham-Kent has Ontario’s highest per capita mortality rate from heart attacks (Aaron, 2017). Cardiovascular disease was one of the leading causes of mortality for Chatham-Kent, second to cancer (PHO, 2014). To understand why cardiovascular disease-related deaths are so high, Nancy needs to establish a description of the community and conduct geographic comparisons of cardiovascular disease and chronic disease-related risk factors.

The Municipality of Chatham-Kent is located in Southwestern Ontario between Lakes St. Clair and Erie and has select major city centres including Chatham, Wallaceburg, and Tilbury (see Exhibit 1). Established in 1998 with the amalgamation of 23 separate communities, the Municipality of Chatham-Kent is a single-tiered municipality (Association of Municipalities Ontario, 2017). This implies that the municipality is responsible for all public services to their residents and for all communities within the municipality (Association of Municipalities Ontario, 2017). The estimated population in 2016 was 102,042, down 2% from 2011 (Statistics Canada, 2017a). Just over half of Chatham-Kent’s population resides within the three stated urban centres, with the remaining residing in surrounding rural communities (Francis, 2015). When compared to Ontario, Chatham-Kent had a 28% lower median household total income for 2015 [Chatham-Kent ($58,185), Ontario ($74,287)] and a 7% lower labour force participation rate for 2016 [Chatham-Kent (60.2%), Ontario (64.7%)] (Statistics Canada, 2017b; Statistics Canada, 2017c).

Under the Canadian Census, there are established peer groups that allow for health units (in the case of Ontario) to be compared based on geographic and demographic characteristics. Chatham-Kent is a part of Public Health Ontario’s “Mainly Rural” peer group, which maps to Statistics Canada’s peer groups D and E (see Exhibit 2) (PHO, 2016a).

Utilizing the epidemiological approach, Nancy needs to compare cardiovascular disease-related mortality between populations by using age standardized rates to assess the wellbeing of Chatham-Kent residents. She is provided with raw data outlining the number of deaths and total population of different regions by age. To begin, she compares Chatham-Kent to Ontario as a whole, then Lambton County to Ontario, and lastly Chatham-Kent to Haldimand-Norfolk.

CHATHAM-KENT CARDIOVASCULAR DISEASE MORTALITY
Nancy needed help from a colleague on her team. She asked Jack to create a report addressing the following:

Calculate the appropriate rates outlined in Worksheet 1 and answer the following questions:
1. What is Chatham-Kent’s crude mortality rate for cardiovascular disease?
   a. Provide an interpretation for the rate.
   b. Can the rate be directly compared to Ontario’s crude mortality rate? Why or why not?
2. What is Chatham-Kent’s age standardized mortality rate for cardiovascular disease?
   a. How does Chatham-Kent’s age standardized rate compare to that of Ontario’s?
   b. What conclusions can be made based on the results?

LAMBTON COUNTY CARDIOVASCULAR DISEASE MORTALITY
Nancy was also interested in Lambton County, a neighbouring region to Chatham-Kent. Once again she asked Jack to calculate and interpret mortality rates, the summary of which is displayed in the following statement:

The crude cardiovascular disease mortality rate for Lambton County during 2011 was 299.2 deaths per 100,000 population. Accounting for different age structures through the
direct age standardization method, Lambton County recorded an age standardized, cardiovascular disease mortality rate of 240 deaths per 100,000 population, while Ontario recorded a rate of 185 deaths per 100,000 population during 2011.

HALDIMAND-NORFOLK CARDIOVASCULAR DISEASE MORTALITY
The Haldimand-Norfolk Public Health Unit is a part of the same peer group as the Chatham-Kent Public Health Unit: Mainly Rural. The purpose of the peer groups is to highlight regional similarities that may be overshadowed when grouped together with dissimilar regions (e.g. comparing Southern Ontario to Ontario as a whole where each group contains differently structured populations). In this case, the rurality of communities is the common similarity expressed by the Mainly Rural peer group. Comparing similar regions allows one to see if the differences seen against Ontario are unique to that region or are characteristic of rural areas in general. In this case, if cardiovascular disease mortality rates seen in Chatham-Kent are similar to Haldimand-Norfolk, it infers a rural connection to higher rates. If they are uniquely higher than both Haldimand-Norfolk and Ontario, the rural connection may still be present, however, it indicates that other factors are at play.

To round out the report Nancy asked Jack to provide the following information:

Calculate the appropriate rates outlined in Worksheet 2 and answer the following questions:

1. What is Chatham-Kent’s age standardized mortality rate for cardiovascular disease?
   a. How does Chatham-Kent’s age standardized rate compare to that of Haldimand-Norfolk’s?
   b. What conclusions can be made based on this result?

CONCLUSION
During 2014, Chatham-Kent was ranked seventh in the province for adult smoking rates (28% of the adult population were recorded as daily or occasional smokers) and fifth in combined overweight and obesity rankings (61% of the population were either overweight or obese) (PHO, 2016b; PHO, 2016c). Knowing that these are major contributors to cardiovascular disease, and based on the rates calculated for cardiovascular disease mortality, Nancy was faced with the following questions:

1. Does Chatham-Kent, as a rural community, experience greater health disparities? Is there additional information needed to answer this question and how would she go about finding it?
2. Ultimately, how best should she present her findings to the Board of Health?

With these questions in hand, Nancy prepared for her upcoming Board meeting, ready to present on the wellbeing of her rural community and help inform future programming and service delivery.
Rural Residence and Associated Health Disparities: The Case of Chatham-Kent

EXHIBIT 1
Municipality of Chatham-Kent Map

### EXHIBIT 2
Public Health Ontario (PHO) Peer Groups and Statistics Canada 2015 Peer Groups

<table>
<thead>
<tr>
<th>Peer Group</th>
<th>Public Health Unit</th>
</tr>
</thead>
</table>
| • PHO: Population centres with high population density and rural mix | Brant County Health Unit  
City of Hamilton Health Unit  
Middlesex-London Health Unit  
Niagara Regional Area Health Unit  
Windsor-Essex County Health Unit |
| • Statistics Canada peer group A                |                                                                                     |
| • PHO: Population centres with moderate population density      | City of Ottawa Health Unit  
Durham Regional Health Unit  
Halton Regional Health Unit  
Simcoe Muskoka District Health Unit  
Waterloo Health Unit  
Wellington-Dufferin-Guelph Health Unit |
| • Statistics Canada peer group B                |                                                                                     |
| • PHO: Population centres and rural mix            | Elgin-St. Thomas Health Unit  
Hastings and Prince Edward Counties Health Unit  
Kingston, Frontenac and Lennox and Addington Health Unit  
Lambton Health Unit  
North Bay Parry Sound District Health Unit  
Northwestern Health Unit  
Peterborough County-City Health Unit  
Porcupine Health Unit  
Sudbury and District Health Unit  
Thunder Bay District Health Unit  
Timiskaming Health Unit |
| • Statistics Canada peer group C                |                                                                                     |
| • PHO: Mainly rural                               | Chatham-Kent Health Unit  
District of Algoma Health Unit  
Eastern Ontario Health Unit  
Grey Bruce Health Unit  
Haldimand-Norfolk Health Unit  
Haliburton, Kawartha, Pine Ridge District Health Unit  
Huron County Health Unit  
Leeds, Grenville and Lanark District Health Unit  
Oxford County Health Unit  
Perth District Health Unit  
Renfrew County and District Health Unit |
| • Statistics Canada peer groups D & E             |                                                                                     |
| • PHO: Largest population centres with high population density | City of Toronto Health Unit  
Peel Regional Health Unit  
York Regional Health Unit |

Source: Public Health Ontario (PHO), 2016a.
### WORKSHEET 1
Cardiovascular Disease Mortality Rates: Chatham-Kent and Ontario

#### 2011

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Chatham-Kent</th>
<th>Ontario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. Deaths</td>
<td>2011 Population</td>
</tr>
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<td>25,099</td>
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<tr>
<td>20-44</td>
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#### Direct Age Standardization

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<th>Ontario</th>
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</thead>
<tbody>
<tr>
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<td>2011 Composite Population</td>
<td>Age-Specific Rate</td>
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<tr>
<td>0-19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-44</td>
<td></td>
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<tr>
<td>75+</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
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</tbody>
</table>

Age Standardized Rate: Chatham-Kent  Age Standardized Rate: Ontario

### Notes:
1. All age-specific and age standardized rates are per 100,000 population.
2. All values calculated should be done so to three decimal places.
3. All reported values should be done so to one decimal place.

Source: Created by author.
WORKSHEET 2
Cardiovascular Disease Mortality Rates: Haldimand-Norfolk and Chatham-Kent

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Haldimand-Norfolk</th>
<th>Chatham-Kent</th>
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<tbody>
<tr>
<td></td>
<td>No. Deaths</td>
<td>2011 Population</td>
</tr>
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<td>75+</td>
<td>240</td>
<td>8681</td>
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<td>Total</td>
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Direct Age Standardization

<table>
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<tr>
<td>Total</td>
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<td></td>
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</tbody>
</table>

Age Standardized Rate: Haldimand-Norfolk  
Age Standardized Rate: Ontario

Notes:
1. All age-specific and age standardized rates are per 100 000 population.
2. All values calculated should be done so to three decimal places.
3. All reported values should be done so to one decimal place.

Source: Created by author.
REFERENCES


INSTRUCTOR GUIDANCE

Rural Residence and Associated Health Disparities: The Case of Chatham-Kent

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BACKGROUND
Rural populations face notably higher rates of chronic diseases than urban areas, specifically, cardiovascular diseases, chronic respiratory diseases, cancer, and diabetes. This case focuses on Chatham-Kent, a small, rural town in Southwestern Ontario, to illustrate this point. More specifically, the case focuses on an epidemiological approach to provide evidence of the health disparities due to an individual’s place of residence. Based on the comparison of age-standardized rates, does the rural community of Chatham-Kent experience greater health disparities?

This case provides the reader with practice in calculating and interpreting crude and age-standardized rates and the ability to disseminate findings about the health status of a given population.

OBJECTIVES
1. Understand basic epidemiological terminology, such as crude rates, age-adjusted rates, and epidemiological approach.
2. Apply the mechanisms behind the derivation of crude and age-adjusted rates in analysis of health data.
3. Understand how the epidemiological approach can identify health disparities amongst different populations.
4. Compare the health statuses of different populations accurately with appropriate measures.
5. Effectively communicate the results of a health data analysis to intended audience(s).

DISCUSSION QUESTIONS
Most discussion should focus around the Case Analysis questions, although, if discussion dies off, or to initiate conversation, the following could be presented:
1. Are there any personal experiences that could help illustrate the points made by the case (e.g. within previous/current employment, previous/current courses, etc.)?
2. How would the presentation of mortality rates differ when presenting to fellow public health professionals (either with or without an epidemiologic background) or to the general public?
3. Based on the results of the case, what interventions would you suggest, if any?

KEYWORDS
Epidemiological approach; age standardized rates; crude rates; mortality; rural health; chronic disease; chronic disease-related risk factors.