

CASE 14

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

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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 rural¹ 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).

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

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

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

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



Source: New Staff Orientation PowerPoint: Chatham-Kent Public Health, 2017.

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

EXHIBIT 2

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

Peer Group	Public Health Unit
<ul style="list-style-type: none"> • PHO: Population centres with high population density and rural mix • Statistics Canada peer group A 	Brant County Health Unit City of Hamilton Health Unit Middlesex-London Health Unit Niagara Regional Area Health Unit Windsor-Essex County Health Unit
<ul style="list-style-type: none"> • PHO: Population centres with moderate population density • Statistics Canada peer group B 	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
<ul style="list-style-type: none"> • PHO: Population centres and rural mix • Statistics Canada peer group C 	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
<ul style="list-style-type: none"> • PHO: Mainly rural • Statistics Canada peer groups D & E 	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
<ul style="list-style-type: none"> • PHO: Largest population centres with high population density • Statistics Canada peer groups G & H 	City of Toronto Health Unit Peel Regional Health Unit York Regional Health Unit

Source: Public Health Ontario (PHO), 2016a.

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

WORKSHEET 1

Cardiovascular Disease Mortality Rates: Chatham-Kent and Ontario

2011	Chatham-Kent			Ontario		
Age Group	No. Deaths	2011 Population	Age-Specific Rate	No. Deaths	2011 Population	Age-Specific Rate
0-19	0	25,099		29	3,103,210	
20-44	7	30,564		341	4,512,766	
45-64	40	32,334		3054	3,760,476	
65-74	45	9904		3423	1,012,644	
75+	234	8781		17677	874,448	
Total						

Direct Age Standardization

2011	Chatham-Kent			Ontario	
Age Group	2011 Composite Population	Age-Specific Rate	Expected Deaths	Age-Specific Rate	Expected Deaths
0-19					
20-44					
45-64					
65-74					
75+					
Total					

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.

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

WORKSHEET 2

Cardiovascular Disease Mortality Rates: Haldimand-Norfolk and Chatham-Kent

2011 Age Group	Haldimand-Norfolk			Chatham-Kent		
	No. Deaths	2011 Population	Age-Specific Rate	No. Deaths	2011 Population	Age-Specific Rate
0-19	0	25,368		0	25,099	
20-44	3	30,894		7	30,564	
45-64	33	35,166		40	32,334	
65-74	49	10,644		45	9904	
75+	240	8681		234	8781	
Total						

Direct Age Standardization

2011 Age Group	Haldimand-Norfolk			Chatham-Kent	
	2011 Composite Population	Age-Specific Rate	Expected Deaths	Age-Specific Rate	Expected Deaths
0-19					
20-44					
45-64					
65-74					
75+					
Total					

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.

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

REFERENCES

1. Aaron. (2017). Ontario's highest per-capita death rate from heart attacks. Retrieved from <http://sydenhamcurrent.ca/2017/05/27/ontarios-highest-per-capita-death-rate-heart-attacks/>
2. Association of Municipalities Ontario (AMO). (2017). Ontario Municipalities. Retrieved from <http://www.amo.on.ca/amo-content/municipal-101/ontario-municipalities.aspx>
3. Caldwell, W.J., Kraehling, P., Kaptur, S., & Huff, J. (2015). Healthy Rural Communities Tool Kit—A Guide for Rural Municipalities. Retrieved from <https://www.publichealthontario.ca/en/ServicesAndTools/Documents/LDCP/HealthyRuralCommunitiesToolkit%20compressed.pdf>
4. Chatham-Kent. (2017). Population by Community 2016. Retrieved from <https://www.chathamkent.ca/EconomicDevelopment/LabourForceStatistics/Demographics/Pages/populatio%20by%20community.aspx>
5. Eberhardt, M.S., & Pamuk, E.R. (2004). The importance of Place of Residence: Examining Health in Rural and Nonrural Areas. *American Journal of Public Health*, 94(10), 1682-1686.
6. Francis, D. (2015). Chatham-Kent. Retrieved from <http://www.thecanadianencyclopedia.ca/en/article/chatham-kent/>
7. Hartley, D. (2004). Rural health disparities, population health, and rural culture. *American Journal of Public Health*, 94(10), 1675-1678.
8. Heart & Stroke. (2017). The kids are not alright. How the food and beverage industry is marketing our children and youth to death. 2017 Report on the Health of Canadians. Retrieved from <https://www.heartandstroke.ca/-/media/pdf-files/canada/2017-heart-month/heartandstroke-reportonhealth2017.ashx>
9. New Staff Orientation PowerPoint: Chatham-Kent Public Health. (2017)
10. Public Health Ontario (PHO). (2014). Chronic Disease Mortality Snapshot, 2011. Retrieved from <http://www.publichealthontario.ca/en/DataAndAnalytics/Snapshots/Pages/Chronic-Disease-Mortality.aspx>
11. Public Health Ontario (PHO). (2016a). Chronic Disease Hospitalization. Retrieved from <http://www.publichealthontario.ca/en/DataAndAnalytics/Snapshots/Pages/Chronic-Disease-Hospitalization.aspx>
12. Public Health Ontario (PHO). (2016b). Self-Reported Smoking Snapshot. Retrieved from <https://www.publichealthontario.ca/en/DataAndAnalytics/Snapshots/Pages/Health-Behaviours---Smoking.aspx>
13. Public Health Ontario (PHO). (2016c). Self-Reported Nutrition and Healthy Weights Snapshot. Retrieved from <https://www.publichealthontario.ca/en/DataAndAnalytics/Snapshots/Pages/Health-Behaviours---Nutrition-and-Healthy-Weights.aspx>
14. Statistics Canada. (2015). Canada's rural population since 1851. Retrieved from http://www12.statcan.gc.ca/census-recensement/2011/as-sa/98-310-x/98-310-x2011003_2-eng.cfm
15. Statistics Canada. (2017a). Census Profile, 2016 Census. Retrieved from <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=3536020&Geo2=PR&Code2=35&Data=Count&SearchText=Chatham-Kent&SearchType=Begins&SearchPR=01&B1=All&GeoLevel=PR&GeoCode=3536020&TABID=1>
16. Statistics Canada. (2017b). Focus on Geography Series, 2016 Census, Chatham-Kent, (CA) - Ontario. Retrieved from <http://www12.statcan.gc.ca/census-recensement/2016/as-sa/fogs-spg/Facts-CMA-Eng.cfm?TOPIC=11&LANG=Eng&GK=CMA&GC=556>
17. Statistics Canada. (2017c). Focus on Geography Series, 2016 Census, Province of Ontario. Retrieved from <http://www12.statcan.gc.ca/census-recensement/2016/as-sa/fogs-spg/Facts-pr-eng.cfm?LANG=Eng&GK=PR&GC=35&TOPIC=11>

INSTRUCTOR GUIDANCE

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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.