Catalogue no. 82-003-X
ISSN 1209-1367

Health Reports

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Release date: December 19, 2018

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Prevalence of insomnia for Canadians aged 6 to 79

by Jean-Philippe Chaput, Jessica Yau, Deepa P. Rao and Charles M. Morin

Abstract

This study estimates the prevalence of nighttime insomnia symptoms among Canadians aged 6 to 79, and examines trends over time (2007 to 2015). The study is based on 21,826 respondents from the 2007-to-2015 Canadian Health Measures Survey, a nationally representative, cross-sectional survey. Nighttime insomnia symptoms and duration were self-reported. A 42% increase in nighttime insomnia symptoms was observed for adults aged 18 or older (from 16.8% to 23.8%). The majority of Canadians with insomnia symptoms reported having the symptoms for more than one year. This study also showed nighttime insomnia symptoms to be more prevalent in older age groups, women, those from lower socioeconomic backgrounds, and individuals reporting poor health and quality of life. Efforts toward prevention and intervention strategies could reduce the burden of insomnia symptoms among Canadians.

Keywords: nighttime insomnia, sleep, trends, surveillance, population health

Insomnia is the most prevalent sleep disorder and affects a large proportion of the population on a situational, recurrent or chronic basis.[1] Insomnia is predominantly characterized by dissatisfaction with sleep and difficulties initiating or maintaining sleep, along with substantial distress and impairments of daytime functioning.[2] Persistent insomnia has been associated with adverse health outcomes, including reduced quality of life and physical and psychological morbidity.[1,2] In Canada, the individual economic burden of insomnia is estimated at $5,010 per person per year, with nearly 90% of this amount attributed to indirect costs such as work absenteeism and reduced productivity.[3] Despite its high prevalence and burden, insomnia is often unrecognized and untreated because of barriers to its assessment and management.[1,2] There is a clear need to develop more cost-effective, efficient and accessible therapies for insomnia.[1,2]

The prevalence of insomnia in epidemiological studies can range from 6% to 48% depending on the definition used (i.e., insomnia symptoms, with or without daytime consequences, dissatisfaction with sleep, and insomnia disorder).[4,5,6] For example, it is estimated that about 25% of adults are dissatisfied with their sleep, 10% to 15% report symptoms of insomnia associated with daytime consequences, and 6% to10% meet criteria for an insomnia disorder.[4,5,6] Tjepkema reported that 13.4% of Canadian adults aged 15 or older had nighttime symptoms of insomnia in 2002; that is, they had difficulty going to sleep or staying asleep most of the time or all of the time.[7] However, it is largely unknown whether nighttime insomnia symptoms have remained stable in recent years in Canada. Furthermore, it is unknown whether school-aged children and adolescents in Canada also report high prevalence of nighttime insomnia symptoms. The present article aims to address this knowledge gap, and builds on Tjepkema's study by also providing data on the duration of nighttime insomnia symptoms among Canadians. A better understanding of the epidemiology of insomnia symptoms in Canada is important to guide resource allocation and inform the development of effective interventions. The Canadian Health Measures Survey (CHMS) questioned Canadians between 2007 and 2015 on their sleep habits. This article summarizes key findings on the prevalence of nighttime insomnia symptoms among Canadians aged 6 to 79 to inform policy decisions.

Data and methods

Data source

The data are from cycles 1 to 4 (2007 through 2015) of the Canadian Health Measures Survey (CHMS), an ongoing nationally representative, cross-sectional survey of the household population aged 3 to 79 conducted by Statistics Canada. Residents of First Nations Reserves or other Aboriginal settlements, institutions and some remote regions, and full-time members of the Canadian Forces were excluded. Ethics approval for the CHMS was obtained from Health Canada's Research Ethics Board.[8]

Respondents answered an interview-administered questionnaire in their home, including seven questions on sleep. Parents/guardians reported the information for respondents younger than 12. Response rates for selected households were 69.6%, 75.9%, 74.1% and 76.4% for cycles 1, 2, 3 and 4, respectively. From the responding households, 88.3% of participants completed the household questionnaire in Cycle 1, 90.5% in Cycle 2, 88.4% in Cycle 3, and 91.5% in Cycle 4. Data for respondents aged 6 to 79 from Cycle 1 (2007 to 2009; n=5604),[9] Cycle 2 (2009 to 2011; n=5783),[10] Cycle 3 (2012 to 2013; n=5219),[11] and Cycle 4 (2014 to 2015; n=5220)[12] were used for the present analysis.

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Definitions

Nighttime insomnia symptoms were determined by the question, "How often do you have trouble going to sleep or staying asleep?" Response options included "never," "rarely," "sometimes," "most of the time" and "all of the time." Respondents who answered either "most of the time" or "all of the time" were considered to have nighttime insomnia symptoms, as previously reported.[7] The **duration of insomnia symptoms** was determined by the question, "How long have you had this trouble?" The five response options were: less than 2 weeks; 2 weeks to less than 6 months; 6 months to less than 1 year; 1 year to less than 2 years; and 2 years or more. Only the percentage of individuals with insomnia symptoms of 1 year or more was presented in the tables; the other response categories could not be shown due to small sample sizes and coefficients of variation that were too unreliable to be published (more than 33.3%). The survey questions about insomnia were identical in all CHMS cycles.

Sleep duration was assessed using the following question: "How many hours do you usually spend sleeping in a 24-hour period, excluding time spent resting?" Responses were rounded to the closest half hour. Respondents were classified as sleeping less than recommended for optimal health (9 hours per night for ages 6 to 13; 8 hours per night for ages 14 to 17; 7 hours per night for ages 18 to 79) or not sleeping less than recomended.[13,14]

Analyses were conducted by sex and age group (children [6 to 13], adolescents [14 to 17], adults [18 to 64], and older adults [65 or older]). Age groups were chosen based on those used for national sleep duration recommendations.[13,14] Participants were also examined by household education and household income. Household education was the highest level acquired by any member of the household; three categories were created (secondary graduation or less, secondary graduation but less than a bachelor's degree, and bachelor's degree or more). Annual household income was reported by participants and collapsed into three levels: less than $40,000; $40,000 to less than $80,000; and $80,000 or more.

Given that previous studies have reported that insomnia is associated with quality of life and perceived physical and mental health, cross-tabulations were used to estimate the prevalence of nighttime insomnia symptoms by these health indicators. Respondents were asked the questions, "In general, would you say your health is…;" "In general, would you say your mental health is…;" and "Would you rate your quality of life as…." Response options included

Table 1
Nighttime insomnia symptoms by age group, sex and socioeconomic status, household population aged 6 to 79, Canada, 2007 to 2015

	2007 to 2009			2009 to 2011			2012 to 2013			2014 to 2015		
	Cycle 1†			Cycle 2			Cycle 3			Cycle 4		
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
Sex, age group, household education and household income	%	from	to	%	from	to	%	from	to	%	from	to
Total aged 6 to 79												
6 to 13	7.7	6.0	9.4	8.0E	5.0	11.1	8.4E	5.1	11.7	8.8	6.0	11.5
14 to 17	12.2	8.2	16.3	12.2E	7.7	16.8	18.7	12.6	24.8	15.3	10.1	20.5
18 to 64	17.7	15.8	19.6	19.3	16.2	22.3	26.9*	22.5	31.3	25.3*	21.8	28.9
65 or older	15.9	10.5	21.2	18.6	14.1	23.1	27.6*	21.0	34.2	22.2	18.6	25.8
Male												
6 to 13	7.4E	4.3	10.5	7.8E	3.1	12.5	8.6E	4.5	12.7	9.3	6.5	12.2
14 to 17	9.3	6.3	12.3	9.3E	5.7	12.9	F	...	...	11.7E	7.2	16.3
18 to 64	13.1	10.7	15.5	18.2	13.0	23.4	23.6*	17.3	29.8	20.8	15.1	26.5
65 or older	12.3	8.8	15.8	14.5	9.7	19.3	24.0E*	14.4	33.7	14.4E	8.7	20.1
Female												
6 to 13	8.0	6.2	9.7	8.2E	4.8	11.6	8.2E	3.9	12.5	8.1E	4.2	12.1
14 to 17	15.3E	8.5	22.2	15.6E	8.8	22.4	26.1*	19.7	32.4	18.7E	10.0	27.3
18 to 64	22.2	20.0	24.5	20.3*	17.6	22.9	30.2*	26.0	34.5	29.9*	24.7	35.0
65 or older	19.2E	10.5	27.9	22.4	16.5	28.3	30.9	20.2	41.7	29.1	23.2	34.9
Household education												
Secondary graduation or less	20.7	16.1	25.3	21.1	15.1	27.0	29.3*	23.1	35.6	28.4*	23.4	33.3
More than secondary graduation, less than a bachelor's degree	17.0	13.7	20.2	18.8*	16.0	21.7	27.1*	21.7	32.4	28.0*	23.8	32.2
Bachelor's degree or more	12.3	10.4	14.1	13.8	10.6	17.0	20.2*	16.5	23.8	16.8	13.0	20.7
Household income												
Less than $40,000	22.9	18.9	26.8	21.2	16.1	26.2	27.0	21.3	32.7	27.5	21.5	33.4
$40,000 to less than $80,000	14.5	11.8	17.2	17.6	13.3	21.8	25.7*	20.3	31.1	23.8*	20.4	27.3
$80,000 or more	13.7	11.7	15.7	15.8	12.4	19.2	22.8*	18.2	27.3	20.1	15.9	24.2

... not applicable
E use with caution
F too unreliable to be published
* significantly different from reference category ($p < 0.05$)
† reference category
Note: Chi-square tests were used.
Source: Statistics Canada, Canadian Health Measures Survey, cycles 1 to 4, 2007 to 2015.

"excellent," "very good," "good," "fair" and "poor."

To account for the design, means and percentages were estimated using survey weights, and confidence intervals and variance were estimated using the survey bootstrap technique.[15,16] Chi-square tests were performed to compare proportions between cycles. P-values were adjusted for multiple comparisons using the false discovery rate (FDR) adjustment method. Differences between estimates were tested for statistical significance at the FDR-adjusted p-value < 0.05. All analyses were conducted with SAS version 9.3 (SAS Institute, Cary, NC, USA).

Results

Nighttime insomnia symptoms of Canadians

Nighttime insomnia symptoms are more prevalent in adults than in adolescents and children. They are also more prevalent in women and in those with less education and income (Table 1). Nighttime insomnia symptoms have also become more prevalent in recent years. For example, nighttime insomnia symptoms increased by 42% over the eight-year period from 2007 to 2015 among Canadians aged 18 or older (from 16.8% in the 2007-to-2009 period to 23.8% in the 2014-to-2015 period [p < 0.05]). Tjepkema[7] reported that 13.4% of Canadian adults had nighttime insomnia symptoms in 2002 using the same question formulation in the Canadian Community Health Survey, indicating that nighttime insomnia has been increasing since at least 2002. Among individuals who reported nighttime insomnia symptoms, the majority of them reported having the symptoms for at least one year (Table 2).

Nighttime insomnia symptoms and adherence to sleep duration recommendations

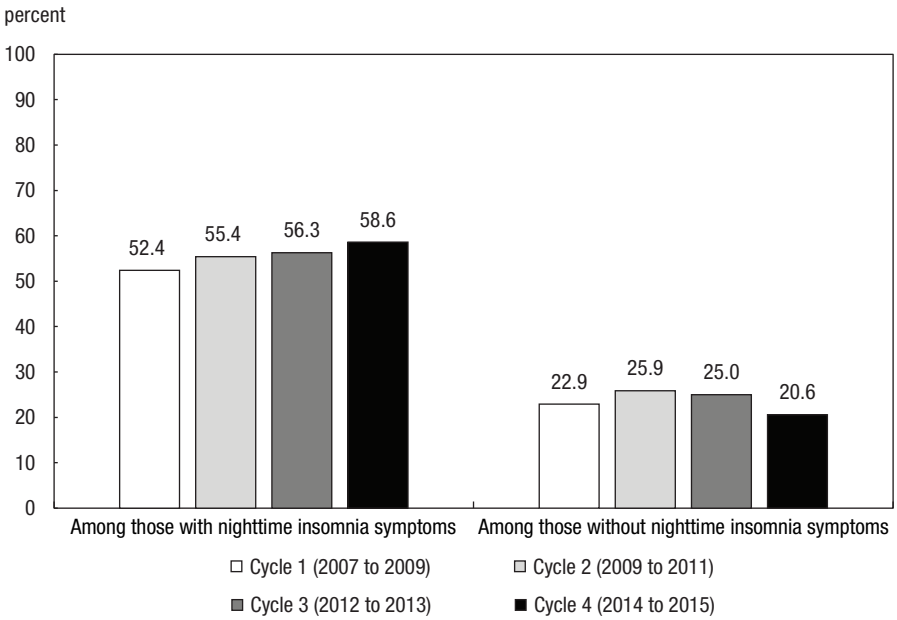
As shown in Figure 1, the proportion of Canadians aged 6 to 79 who were sleeping less than recommended for optimal health[13,14] among those with nighttime insomnia symptoms was the following: for Cycle 1, 52.4% (95% CI: 46.9-58.0); for Cycle 2, 55.4% (95% CI: 47.8-63.0); for Cycle 3, 56.3% (95% CI: 48.9-63.6); and for Cycle 4, 58.6% (95% CI: 51.9-65.2). These estimates are substantially higher than the Canadian average where about one-third of 6-to-79 year-olds reported sleeping fewer hours than recommended.[17,18,19] Among those without nighttime insomnia symptoms, the proportion of Canadians who were sleeping less than recommended was much lower: for Cycle 1, 22.9% (95% CI: 21.1-24.7);

Table 2
Proportion of individuals who experienced nighttime insomnia symptoms for one year or more by age group and sex, household population aged 6 to 79, Canada, 2007 to 2015

	2007 to 2009			2009 to 2011			2012 to 2013			2014 to 2015		
	Cycle 1†			Cycle 2			Cycle 3			Cycle 4		
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
Age group and sex	%	from	to	%	from	to	%	from	to	%	from	to
6 to 13												
Female	89.5	82.2	96.8	83.0	68.8	97.1	85.8	61.2	100.0	89.9	81.1	98.8
Male	76.4	61.4	91.4	89.3	78.7	99.9	95.1	87.8	100.0	82.5	69.3	95.8
14 to 17												
Female	87.2	80.0	94.4	83.5	71.6	95.4	55.5E*	29.8	81.1	86.4	75.7	97.2
Male	78.3	59.3	97.3	74.1	48.2	100.0	83.3	60.5	100.0	74.7	53.3	96.0
18 to 64												
Female	87.9	80.9	94.9	88.7	81.5	95.8	78.8*	71.1	86.4	92.0*	87.6	96.4
Male	88.9	78.2	99.6	92.9	86.9	98.9	89.9	85.3	94.5	90.1	79.1	100.0
65 or older												
Female	96.1	89.6	100.0	98.2	95.8	100.0	93.3	87.7	98.9	93.8	87.8	99.9
Male	92.4	84.3	100.0	92.7	82.4	100.0	86.4	64.8	100.0	92.1	85.2	98.9

E use with caution
* significantly different from reference category (p < 0.05)
† reference category
Note: Chi-square tests were used.
Source: Statistics Canada, Canadian Health Measures Survey, cycles 1 to 4, 2007 to 2015.

Figure 1
Percentage of Canadians aged 6 to 79 years who were sleeping less than recommended for optimal health



Note: Respondents were classified as sleeping less than recommended for optimal health (<9 hours per night for ages 6 to 13; <8 hours per night for ages 14 to 17; <7 hours per night for ages 18 to 79) or not sleeping less than recommended.
Source: Statistics Canada, Canadian Health Measures Survey, cycles 1 to 4, 2007 to 2015.

for Cycle 2, 25.9% (95% CI: 22.6-29.3); for Cycle 3, 25.0% (95% CI: 21.7-28.3); and for Cycle 4, 20.6% (95% CI: 17.2-23.9).

Nighttime insomnia symptoms by self-perceived general health, mental health and quality of life

Nighttime insomnia symptoms are negatively associated with self-perceived general health, mental health and quality of life (Table 3). In other words, the better Canadians perceived their health and quality of life, the fewer nighttime insomnia symptoms they reported. This is in agreement with previous studies.[7,20,21]

Strengths and limitations

The present study needs to be interpreted in light of the following strengths and limitations. Strengths include the nationally-representative sample, the inclusion of children and adolescents, and the examination of trends over time, including the duration of nighttime insomnia symptoms. However, the results need to be interpreted according to the following limitations. The different definitions of insomnia in the literature make comparisons across studies difficult.[4] The use of a standardized definition and methodology when conducting epidemiological studies of insomnia is needed to avoid variability in prevalence rates.[1,2] For example, the present study reported on nighttime insomnia symptoms and not on insomnia diagnoses, which would require the presence of both nighttime and daytime symptoms. Furthermore, the most reliable duration of symptoms for defining insomnia has been shown to be three months;[1,2] however, this duration was not part of the response options in the CHMS. The relatively short time period of the CHMS in trends analysis (eight years) also precludes the examination of possible changes in insomnia symptoms over recent decades. Canadians aged 80 or older were not included in the CHMS, thereby limiting inferences to older age groups. First Nations populations, full-time members of the Canadian Forces and residents of institutions (e.g., nursing homes, group homes and correctional facilities) were not surveyed in the CHMS. Given the particular mental health challenges faced by these populations, insomnia symptoms reported in this article may have been underreported. Finally, future studies should examine cause and effect and use of treatments or strategies from the perspective of patients, the general population and health care providers.

Table 3
Prevalence of nighttime insomnia symptoms by self-perceived general health, mental health and quality of life, household population aged 6 to 79, Canada, 2007 to 2015

	2007 to 2009			2009 to 2011			2012 to 2013			2014 to 2015		
	Cycle 1†			Cycle 2			Cycle 3			Cycle 4		
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
Nighttime insomnia symptoms and health characteristic	%	from	to	%	from	to	%	from	to	%	from	to
Self-perceived general health												
Excellent	8.3[E]	4.8	11.7	9.8[E]	5.9	13.6	16.7[E]*	9.2	24.1	13.5	10.0	17.0
Very good	13.1	10.6	15.5	14.7	11.8	17.5	21.4*	16.8	26.1	16.4	10.8	22.1
Good	19.6	15.8	23.4	16.8*	12.4	21.3	26.2*	21.5	30.9	28.2*	23.6	32.7
Fair	27.3	21.5	33.0	36.2	26.8	45.5	42.7*	34.4	50.9	37.7	32.4	43.0
Poor	49.5[E]	29.2	69.7	73.9*	56.9	90.9	60.9	40.2	81.5	52.0	37.6	66.5
Self-perceived mental health												
Excellent	10.9	8.3	13.5	10.5[E]	6.5	14.5	17.4*	12.7	22.0	13.0	9.3	16.6
Very good	15.3	12.0	18.6	15.5*	12.1	18.8	25.6*	19.7	31.6	23.8*	20.2	27.4
Good	25.9	20.5	31.2	26.0	20.6	31.4	31.7	25.6	37.8	29.9	23.1	36.7
Fair	41.9	30.3	53.5	54.2	39.6	68.9	49.2	40.0	58.4	51.6	36.5	66.6
Poor	58.1[E]	29.3	87.0	79.7[E]	49.4	100.0	68.8[E]	33.2	100.0	42.3[E]	13.9	70.7
Self-perceived quality of life												
Excellent	10.7	8.1	13.2	10.1[E]	6.0	14.2	19.2	12.7	25.6	15.5	11.4	19.6
Very good	13.9	11.0	16.8	16.1*	12.0	20.2	26.0*	22.0	30.0	21.8	16.2	27.4
Good	23.7	18.0	29.5	22.4	17.6	27.2	27.9*	21.1	34.7	30.7	24.1	37.3
Fair	40.8	32.0	49.7	47.3	38.1	56.4	42.2	34.7	49.7	43.2[E]	26.6	59.7
Poor	44.6[E]	19.0	70.1	89.8	75.4	100.0	63.8[E]	29.4	98.2	31.7[E]	8.8	54.5

[E] use with caution
* significantly different from reference category ($p < 0.05$)
† reference category
Note: Chi-square tests were used.
Source: Statistics Canada, Canadian Health Measures Survey, cycles 1 to 4, 2007 to 2015.

Conclusion

The present findings suggest an increase in nighttime insomnia symptoms among Canadians in recent years, especially among adults. The symptoms are also more prevalent among women, those from lower socioeconomic backgrounds, and individuals who reported poor health and quality of life. The majority of Canadians with nighttime insomnia symptoms reported having them for more than one year. In light of these findings, efforts toward prevention and intervention strategies could reduce the burden of insomnia symptoms among Canadians.

Acknowledgements

The authors wish to extend their thanks to the Canadian Health Measures Survey participants and all Statistics Canada staff involved in the survey. ■

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