

Abstract**The Results of the Cold-Related Illness Surveillance in the 2015-2016 to 2019-2020 winter seasons**

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In 2013, the Korea Disease Control and Prevention Agency (KDCA) launched a cold-related illness (CRI) surveillance system. Every winter(December-February), a nationwide network of approximately 500 hospital emergency rooms (ERs) participate in the system. The aim of this report was to analyze the 2015-2016 to 2019-2020 seasons CRI surveillance system.

The KDCA operates the CRI surveillance system to monitor hypothermia, frostbite, trench foot or immersion foot, and chilblain. According to hospital reports, 2,262 people developed CRIs and 53 deaths were attributed to CRI. Findings indicated that the percentage of CRI occurrence was high among males (70.9%); high among people in their 50s (20.2%); high among the unemployed (44.3%); and high among reported drinkers (31.6%). Findings indicated that CRI occurred mainly in Gyeonggi Province (19.3%); between 6 am and 12 pm (30.7%); and the main CRI was hypothermia (80.3%). In terms of location, CRI occurrence was highest at outdoor roadside locations (30.7%) followed by inside the home (16.5%) and locations outside the home (nearby residence) (12.5%).

This report concluded that health damage from CRIs can be prevented by following safety guidelines for cold wave control. Therefore, it falls upon the KDCA to raise public awareness by providing health warnings against CRIs every winter.

Keywords: Cold-related illness, Hypothermia, Frostbite, Surveillance system, Cold wave

Table 1. Reported cases of cold-related illnesses (CRIs)

Winter season	No. of reporting hospitals	Total cases *	Average lowest temperature
2013–2014 (2013.12.1.–2014.2.28.)	436	258 (13 deaths)	-3.2
2014–2015 (2014.12.1.–2015.2.28.)	540	458 (12 deaths)	-3.6
2015–2016 (2015.12.1.–2016.2.29.)	530	483 (26 deaths)	-2.7
2016–2017 (2016.12.1.–2017.2.28.)	532	441 (4 deaths)	-3.2
2017–2018 (2017.12.1.–2018.2.28.)	523	631 (11 deaths)	-5.5
2018–2019 (2018.12.1.–2019.2.28.)	517	404 (10 deaths)	-3.4
2019–2020 (2019.12.1.–2020.2.29.)	505	303 (2 deaths)	-1.4

*Total cases include death cases.

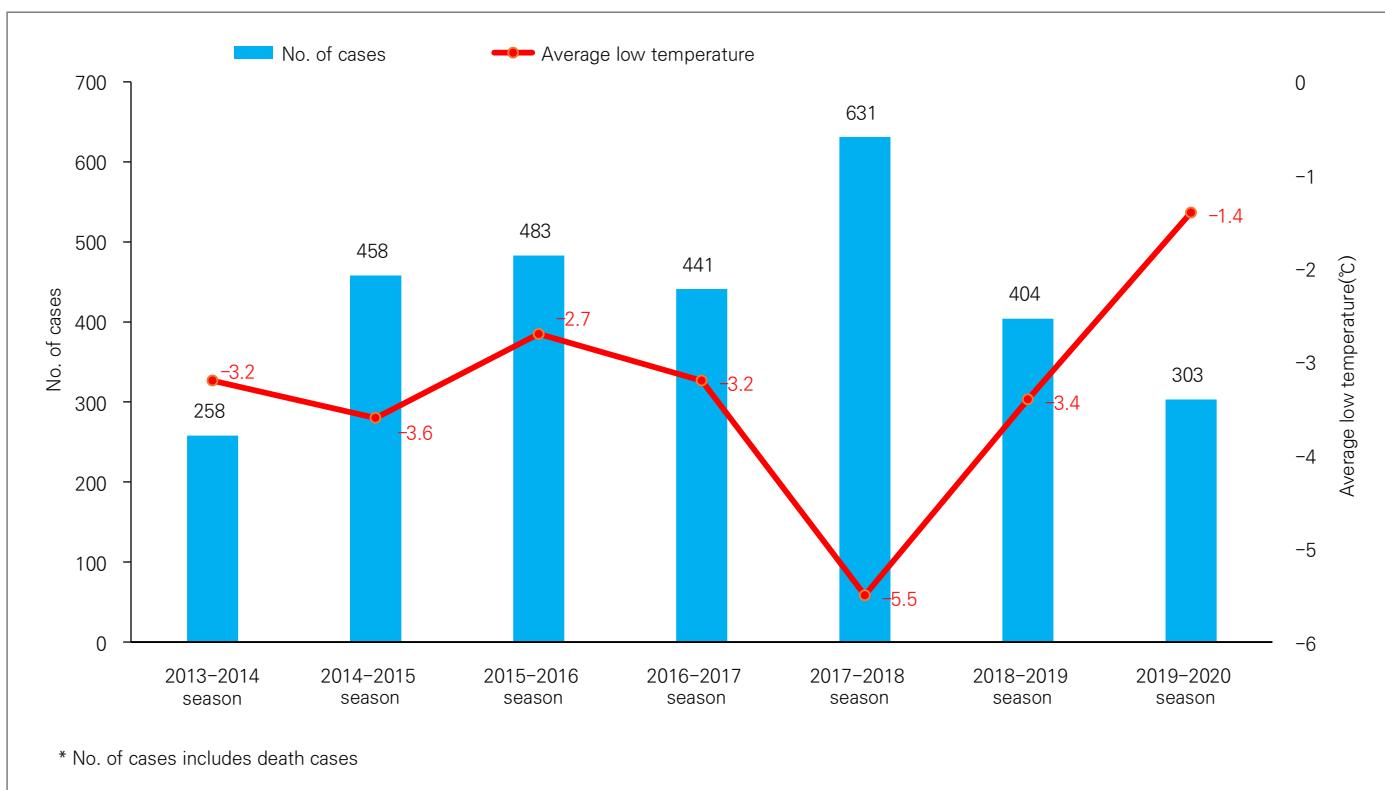


Figure 1. Occurrence of the number of patients by winter season

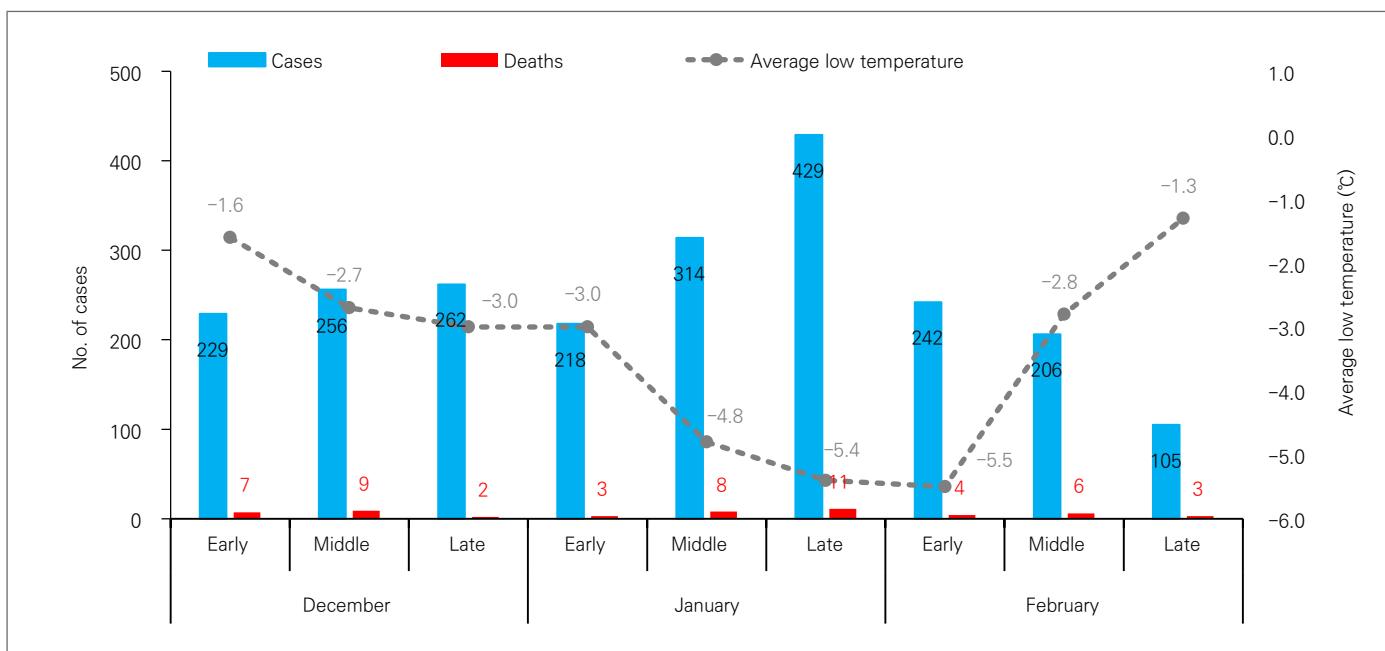


Figure 2. Occurrence of cold-related illnesses (CRIs) and temperature (°C) in the 2015–2016 to 2019–2020 winter seasons

※ Based on the date of occurrence of symptoms, excluding 1 occurrence in November

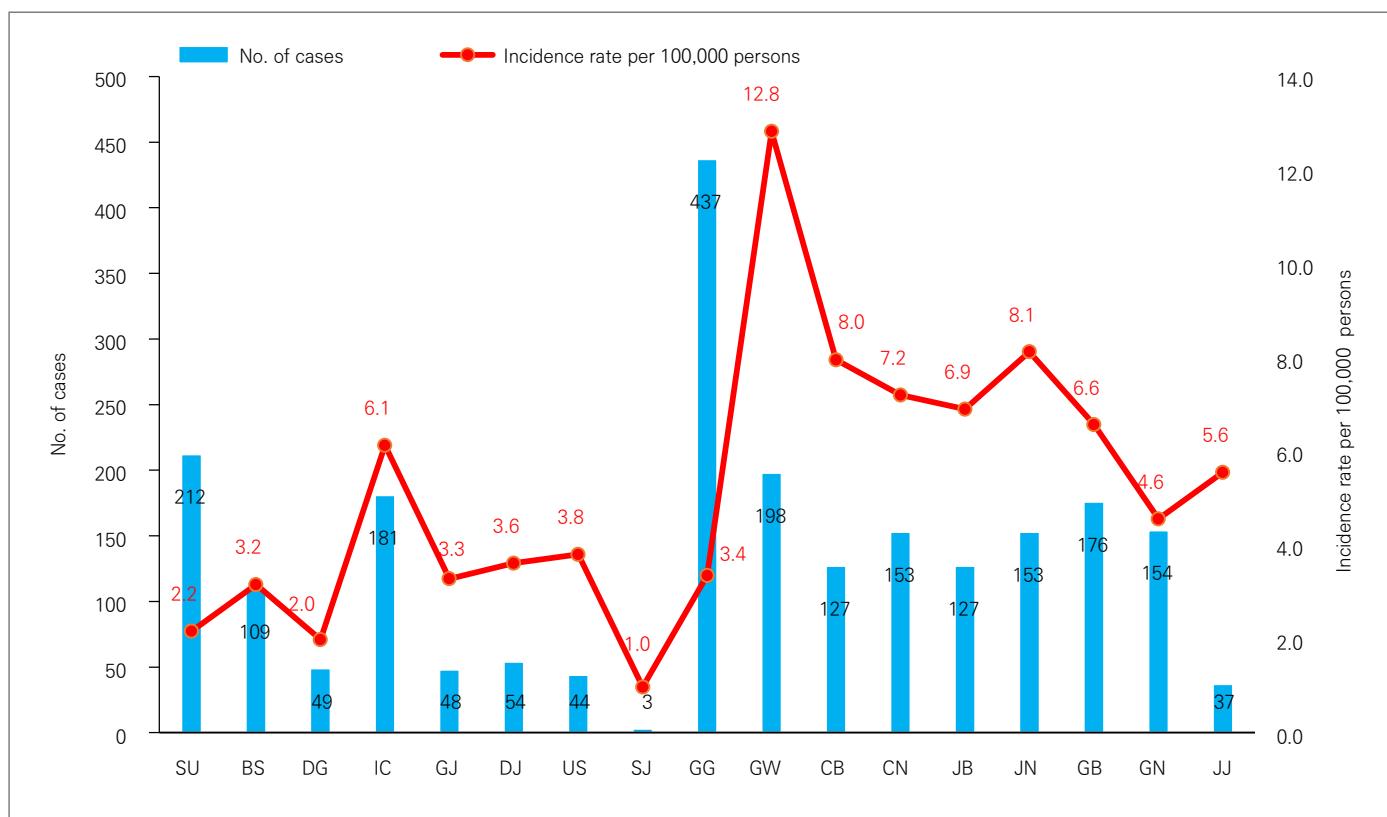


Figure 3. Cold-related illness (CRI) incidence by region

SU: Seoul, BS: Busan, DG: Daegu, IC: Incheon, GJ: Gwangju, DJ: Daejeon, US: Ulsan, SJ: Sejong, GG: Gyeonggi, GW: Gangwon, CB: Chungbuk, CN: Chungnam, JB: Jeonbuk, JN: Jeonnam, GB: Gyeongbuk, GN: Gyeongnam, JJ: Jeju

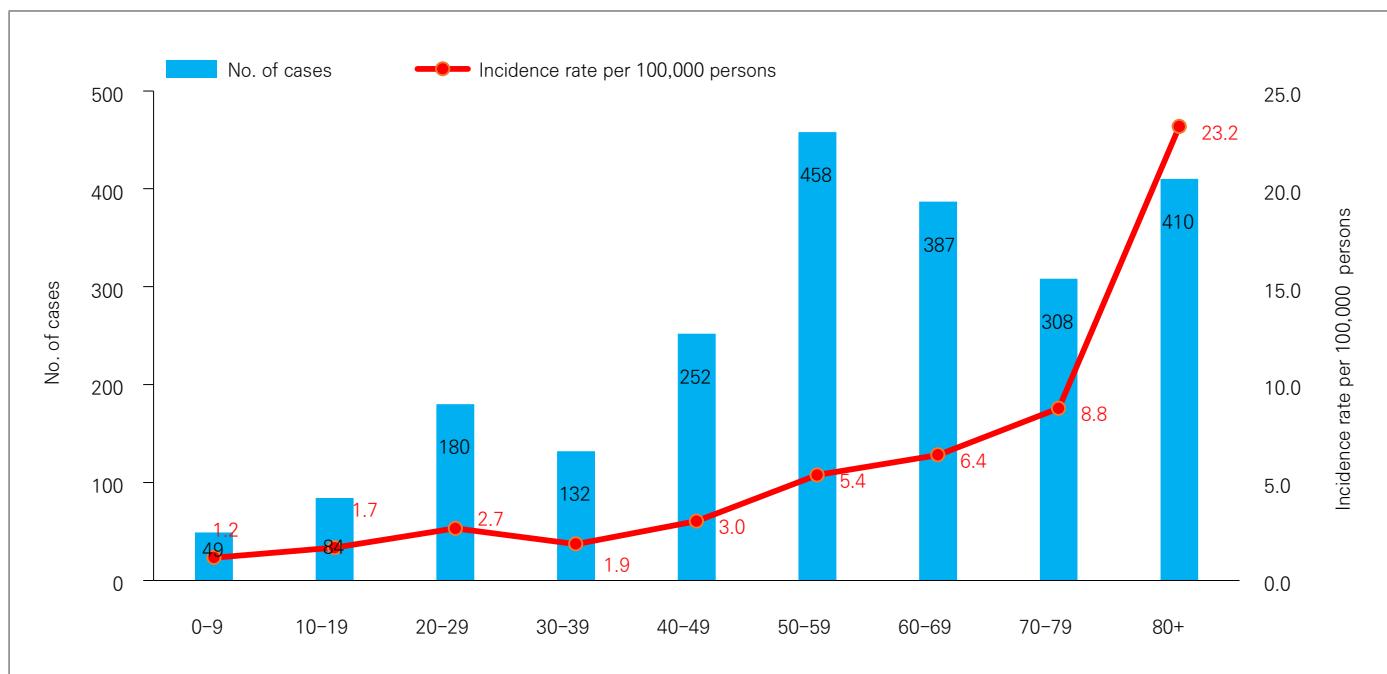


Figure 4. Cold-related illness (CRI) incidence by age

※ Excluding 2 cases of unknown age

Table 2. General characteristics of patients (n = 2,262) with cold-related illnesses (CRI)

	Characteristics	No. of cold-related illnesses (%)	No. of deaths (%)
Gender			
Male		1,604 (70.9)	32 (60.4)
Female		658 (29.1)	21 (39.6)
Region			
Seoul		212 (9.4)	5 (9.4)
Busan		109 (4.8)	2 (3.8)
Daegu		49 (2.2)	0 (0.0)
Incheon		181 (8.0)	1 (1.9)
Gwangju		48 (2.1)	0 (0.0)
Daejeon		54 (2.4)	2 (3.8)
Ulsan		44 (1.9)	0 (0.0)
Sejong		3 (0.1)	0 (0.0)
Gyeonggi		437 (19.3)	4 (7.5)
Gangwon		198 (8.8)	5 (9.4)
Chungbuk		127 (5.6)	4 (7.5)
Chungnam		153 (6.8)	7 (13.2)
Jeonbuk		127 (5.6)	5 (9.4)
Jeonnam		153 (6.8)	5 (9.4)
Gyeongbuk		176 (7.8)	6 (11.3)
Gyeongnam		154 (6.8)	6 (11.3)
Jeju		37 (1.6)	1 (1.9)
Age (years)			
<10		49 (2.2)	0 (0.0)
10–19		84 (3.7)	0 (0.0)
20–29		180 (8.0)	2 (3.8)
30–39		132 (5.8)	0 (0.0)
40–49		252 (11.1)	2 (3.8)
50–59		458 (20.2)	8 (15.1)
60–69		387 (17.1)	12 (22.6)
70–79		308 (13.6)	14 (26.4)
≥ 80		410 (18.1)	15 (28.3)
Unknown		2 (0.1)	0 (0.0)
Alcohol consumption			
Drinker		715 (31.6)	9 (17.0)
Non-drinker		985 (43.5)	4 (7.5)
Unknown		562 (24.8)	40 (75.5)
Diagnosis			
Hypothermia		1,817 (80.3)	53 (100.0)
Superficial frostbite		199 (8.8)	0 (0.0)
Frostbite with tissue necrosis		39 (1.7)	0 (0.0)
Frostbite involving multiple body regions and unspecified frostbite		130 (5.7)	0 (0.0)
Immersion hand and foot		0 (0.0)	0 (0.0)
Chilblains		24 (1.1)	0 (0.0)
Other specified effects of reduced temperature		53 (2.3)	0 (0.0)

Table 2. (Continued) General characteristics of patients (n = 2,262) with cold-related illnesses (CRIs)

Characteristics		No. of cold-related illnesses (%)	No. of deaths (%)
Occurrence location			
Outdoor	Riverside	61 (2.7)	0 (0.0)
	Roadside	33 (1.5)	0 (0.0)
	Farmland	3 (0.1)	0 (0.0)
	Mountain	34 (1.5)	2 (3.8)
	Skating rink	89 (3.9)	4 (7.5)
	Ski resort	151 (6.7)	3 (5.7)
	Playground	175 (7.7)	3 (5.7)
	Work place	694 (30.7)	8 (15.1)
	Nearby residence	283 (12.5)	12 (22.6)
Indoor	Other	201 (8.9)	14 (26.4)
	Home	374 (16.5)	4 (7.5)
	Building	68 (3.0)	2 (3.8)
	Work place	26 (1.1)	0 (0.0)
Time of occurrence	Other	70 (3.1)	1 (1.9)
	0~3	301 (13.3)	7 (13.2)
	3~6	227 (10.0)	6 (11.3)
	6~9	383 (16.9)	10 (18.9)
	9~12	311 (13.7)	16 (30.2)
	12~15	241 (10.7)	2 (3.8)
	15~18	276 (12.2)	8 (15.1)
	18~21	278 (12.3)	1 (1.9)
Occupation	21~24	245 (10.8)	3 (5.7)
	Manager	10 (0.4)	0 (0.0)
	Professionals and related workers	23 (1.0)	0 (0.0)
	Clerks	43 (1.9)	0 (0.0)
	Service workers	37 (1.6)	0 (0.0)
	Sales workers	14 (0.6)	0 (0.0)
	Skilled agricultural, forestry and fishery workers	96 (4.2)	2 (3.8)
	Craft and related trades workers	41 (1.8)	0 (0.0)
	Equipment, machine operating and assembling workers	32 (1.4)	0 (0.0)
	Armed forces	8 (0.4)	0 (0.0)
	Homemaker	22 (1.0)	0 (0.0)
	Student	142 (6.3)	2 (3.8)
	Unemployed	147 (6.5)	1 (1.9)
	Homeless	1,003 (44.3)	33 (62.3)
	Other	112 (5.0)	3 (5.7)

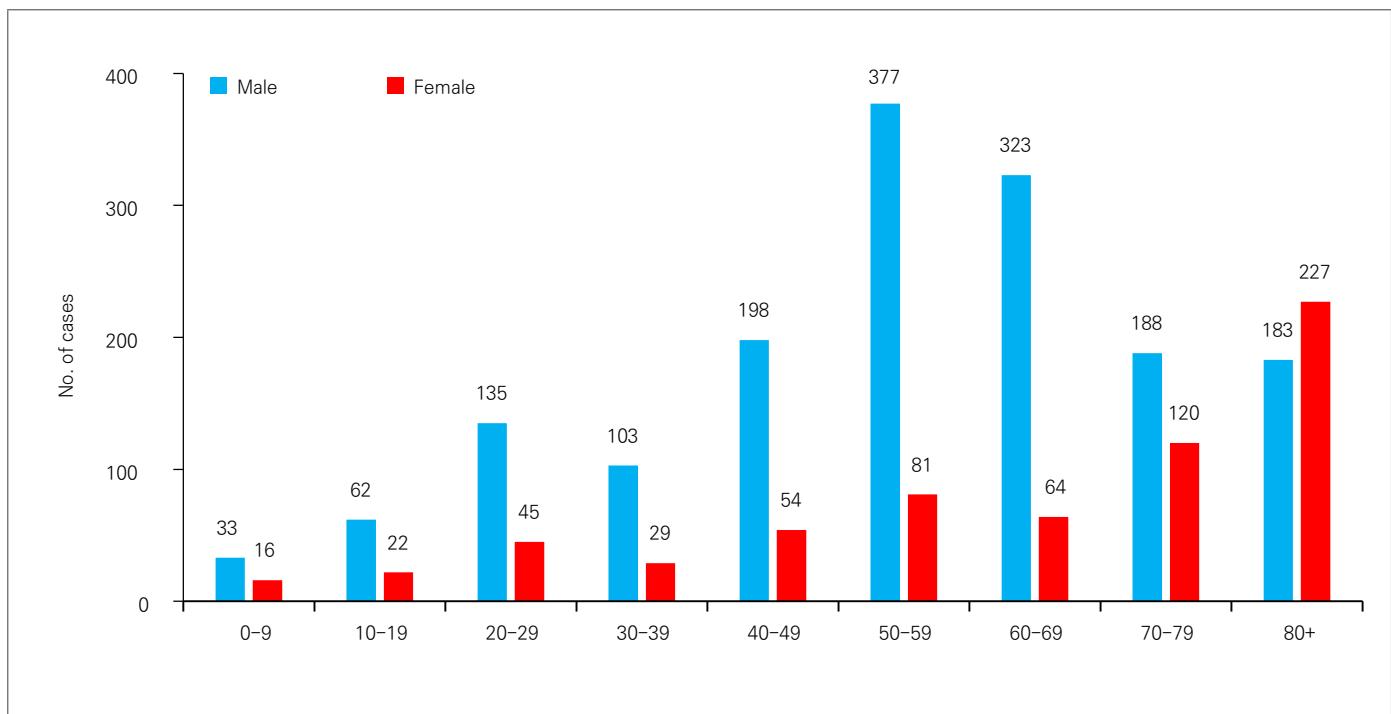


Figure 5. Patient's age group by gender

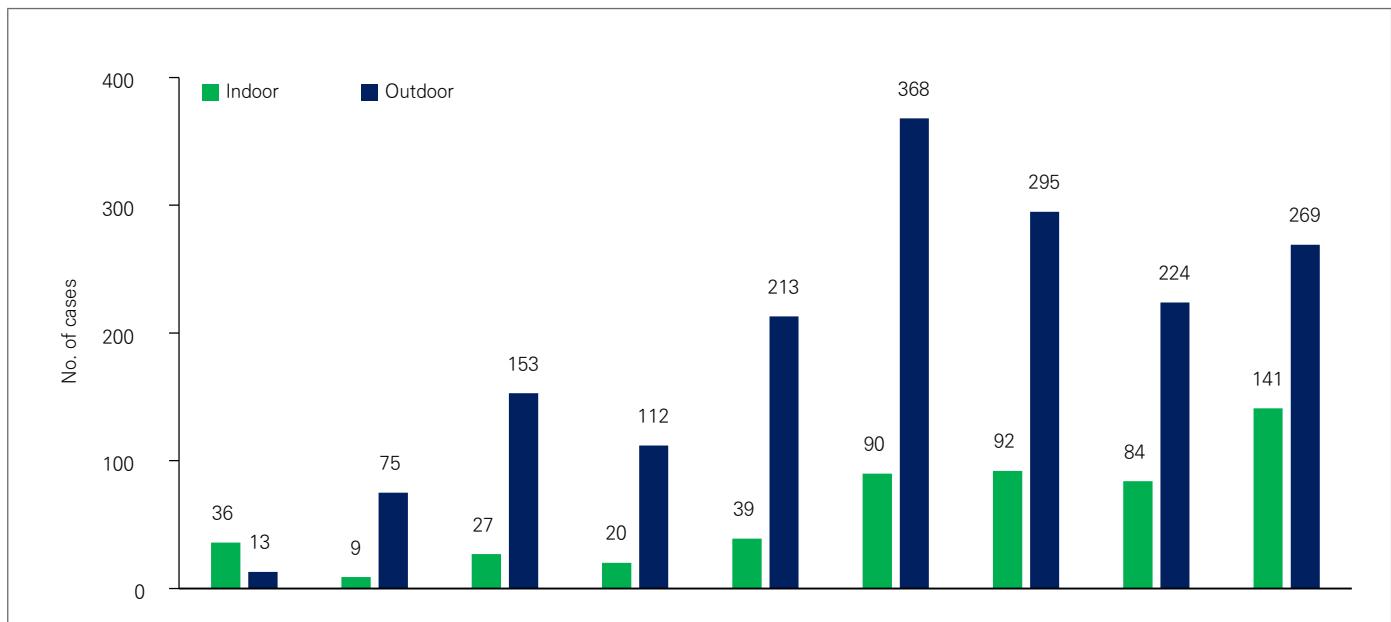


Figure 6. Patient's age group by location (indoor/outdoor)

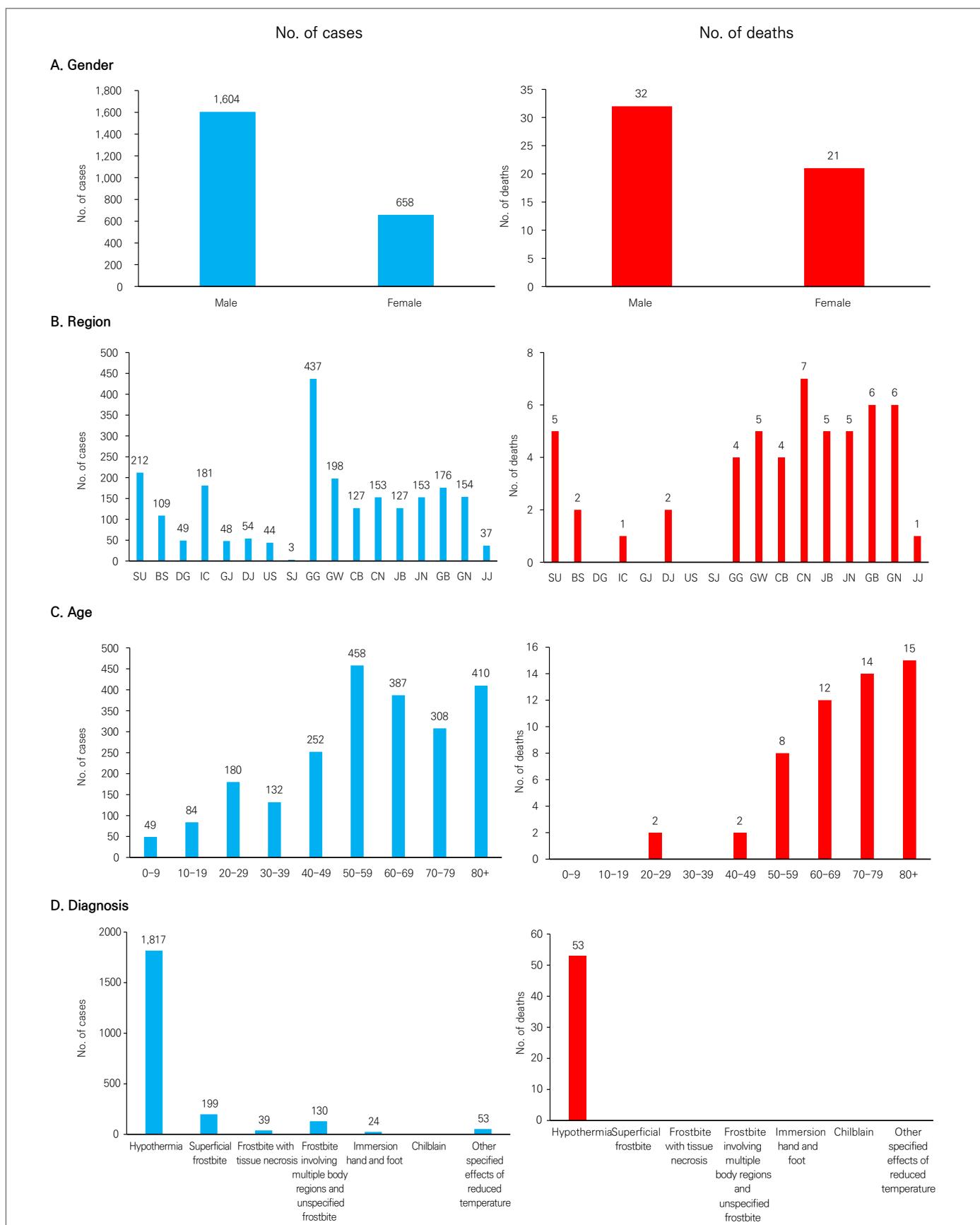


Figure 7. Patient profiles

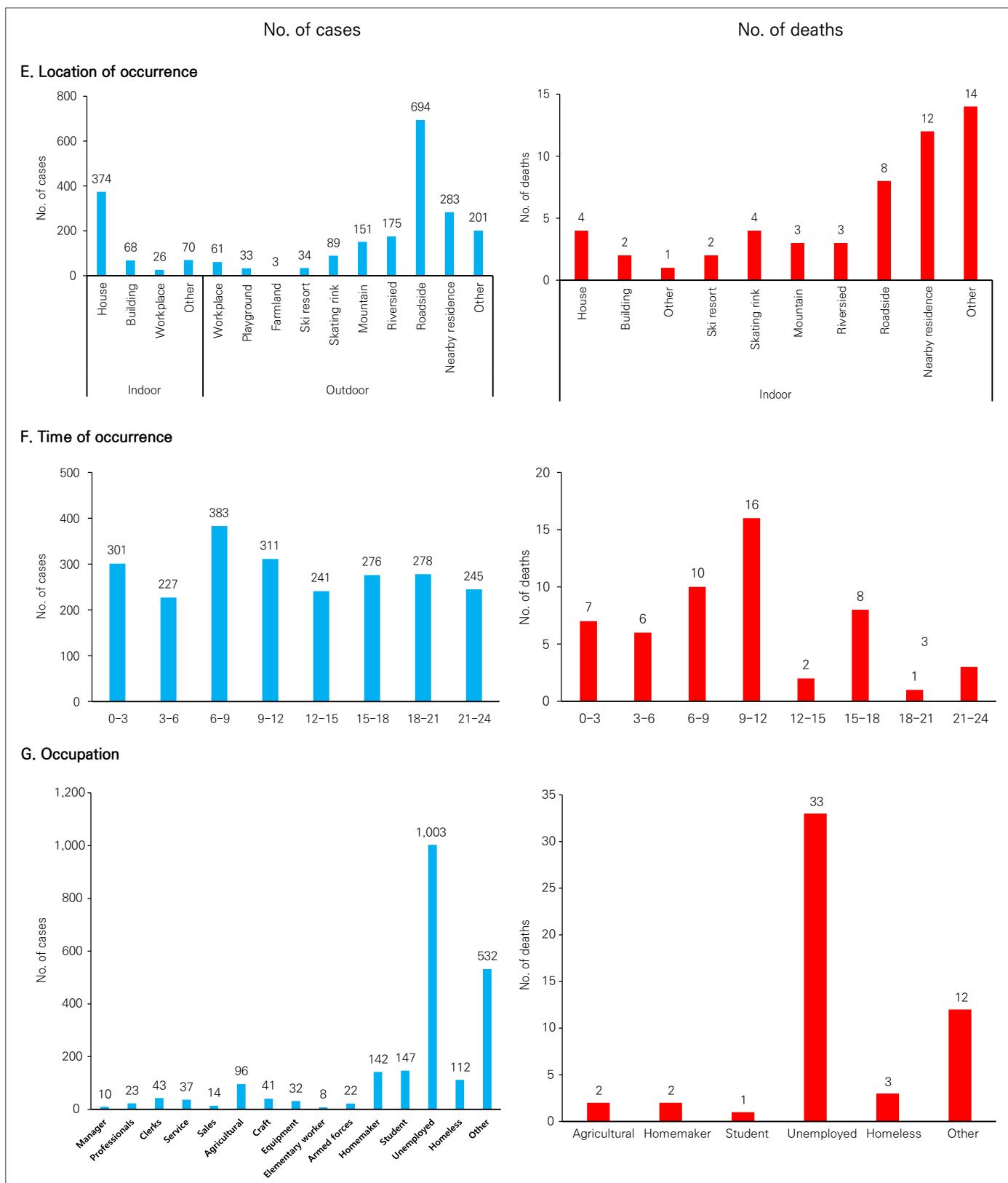


Figure 7. (Continued) Patient profiles

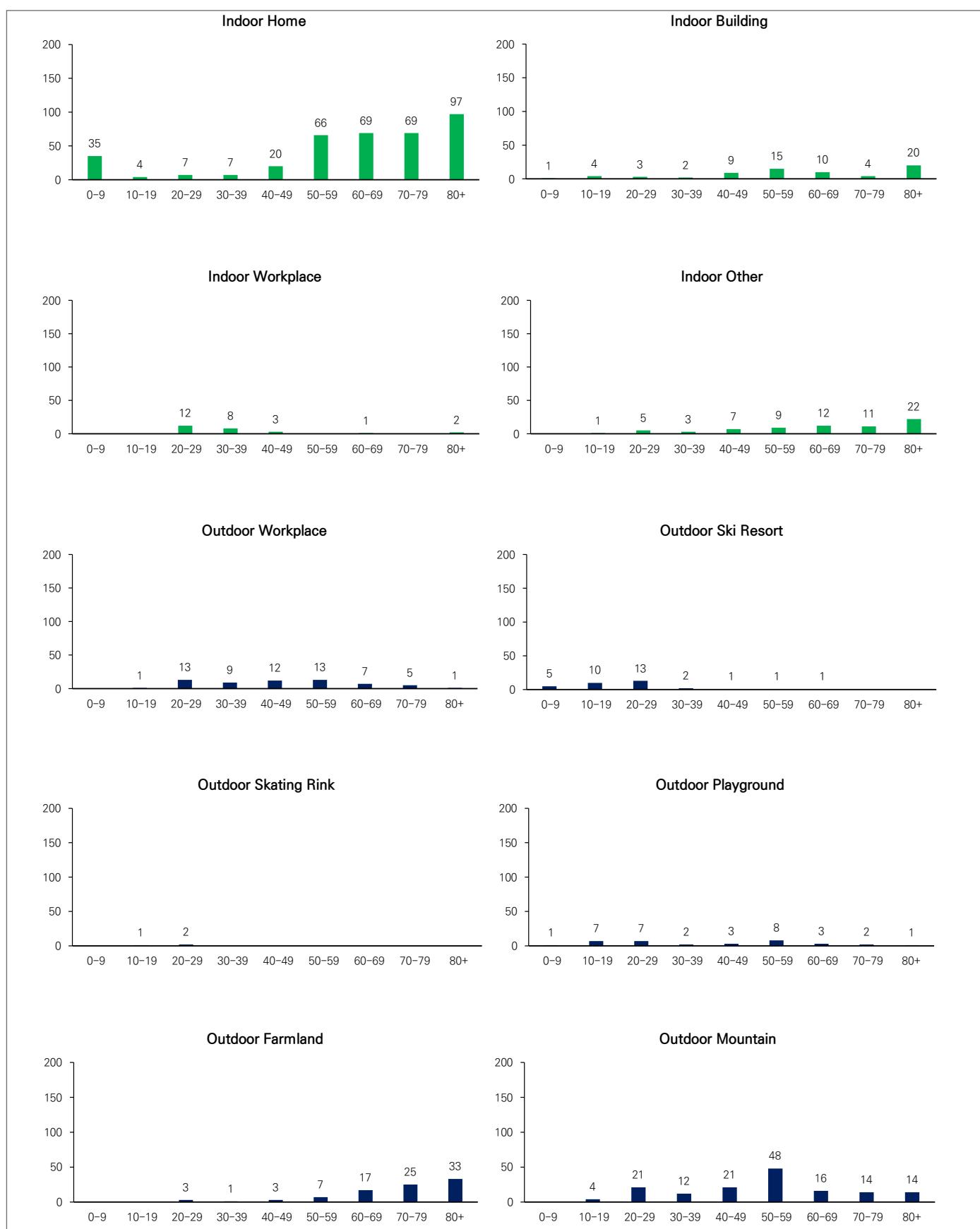


Figure 8. Patient's age group by location

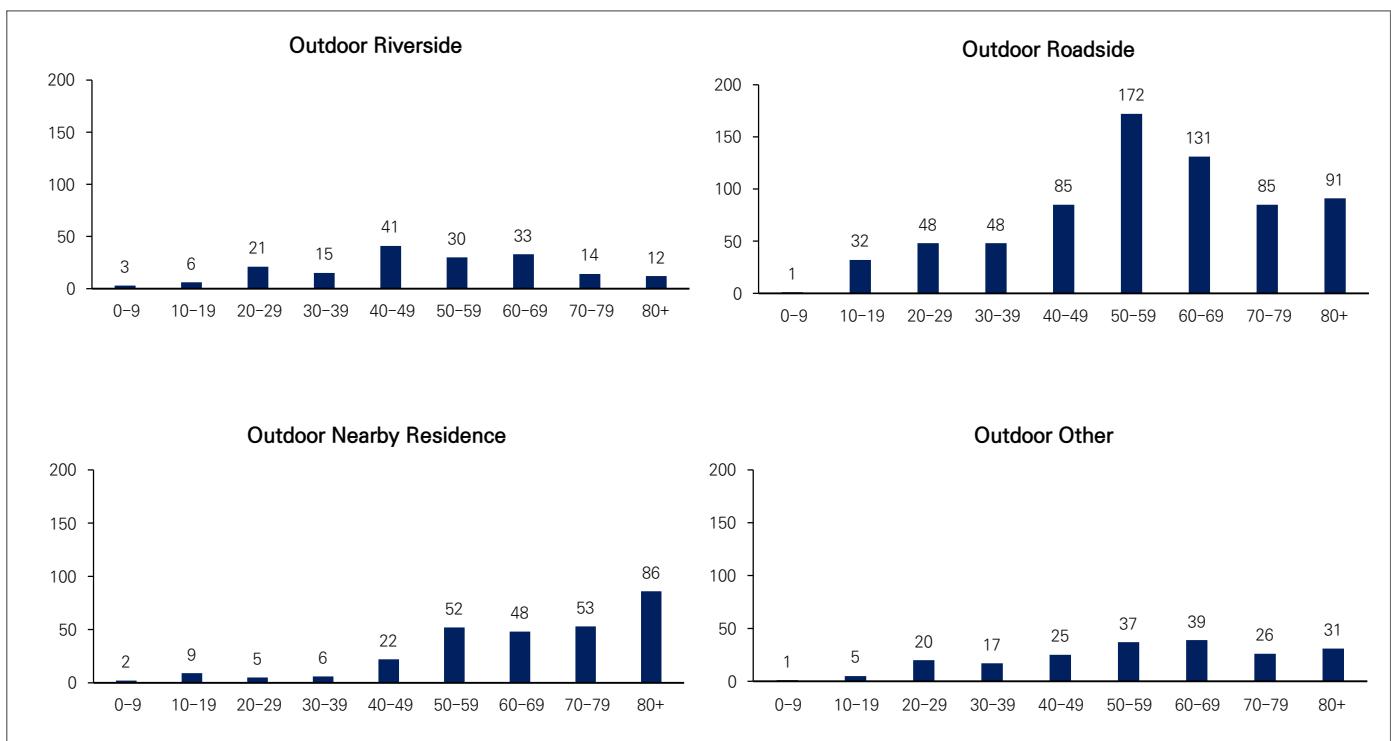


Figure 8. (Continued) Patient's age group by location

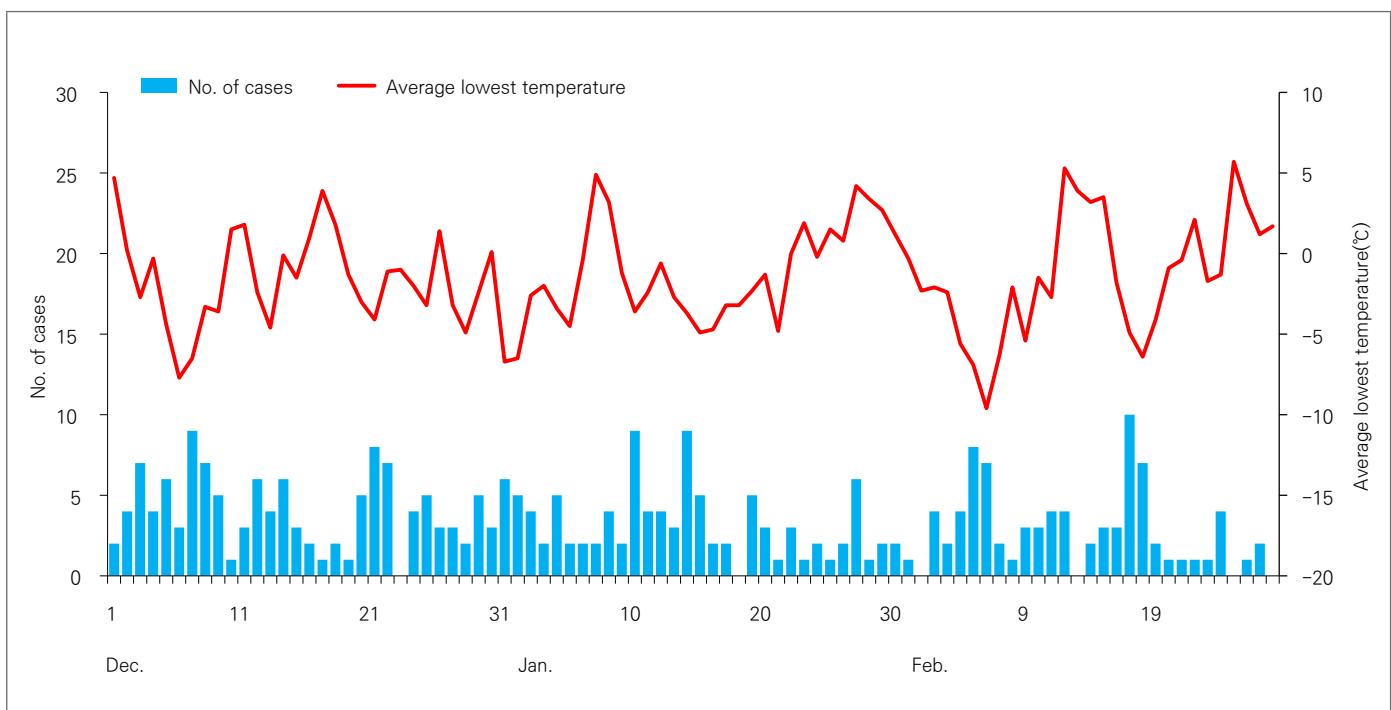


Figure 9. Occurrence of cold-related illness (CRI) and temperature (°C) in the 2019–2020 winter season