

## Abstract

## Characteristics of Varicella Outbreaks in Korea, 2018-2020

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Varicella, also known as 'chicken pox' is a highly infectious acute disease caused by the varicella zoster virus (VZV). Varicella is a common childhood disease and even with the one-dose vaccination program in Korea, which has been available for 15 years, outbreaks continue to occur even among children with high vaccination rate. The aim of this study was to analyze the characteristics of 774 varicella outbreaks that investigated epidemiologic from 2018 to 2020.

This study used Microsoft Excel to analyze the data from both VZV-positive and VZV-suspected cases; a total of 10,704 cases(774 outbreaks). Findings indicated that the average case per outbreak was 15.3(2018), 12.6(2019) and 7.0(2020).

Outbreaks peaked from March to June and from October to December in all three years. In three years (2018-2020), the highest number of reported cases occurred in 2018, most outbreaks occurred in elementary school and outbreak periods were longer in elementary school than in daycare centers and preschools.

This study was meaningful because it was helpful in characterizing varicella outbreaks. However, further study is needed to evaluate epidemiologic characteristics within each outbreak.

**Keywords:** Varicella, Varicella-zoster virus, Outbreak, Elementary school

**Table 1.** Number of varicella epidemic by year, Korea, 2018–2020

		Unit: Number		
Category		2018	2019	2020
Individual cases		89,825	79,125	31,043
Outbreaks cases	Outbreaks	432	297	45
	Cases	6,642	3,743	319
	Cases/outbreaks	15.3	12.6	7.0
Total cases		96,467	82,868	31,362*

\* provisional data; subject to significant change

Table 2. Number of varicella outbreaks and cases by year and month

Unit: Number

Category	Jan.	Feb.	March	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
2018 Outbreaks	11	4	32	57	78	39	22	9	17	51	61	51	432
2018 Cases	59	34	168	790	1,522	806	360	129	101	345	997	1,008	6,319
2019 Outbreaks	14	8	30	37	28	26	15	7	12	40	49	31	297
2019 Cases	397	111	135	396	492	360	272	51	106	235	566	747	3,868
2020 Outbreaks	5	3	1	0	4	4	2	2	1	5	14	4	45
2020 Cases	204	43	13	0	20	34	18	13	4	33	85	50	517
Total Outbreaks	30	15	63	94	110	69	39	18	30	96	124	86	774
Total Cases	660	188	316	1,186	2,034	1,200	650	193	211	613	1,648	1,805	10,704

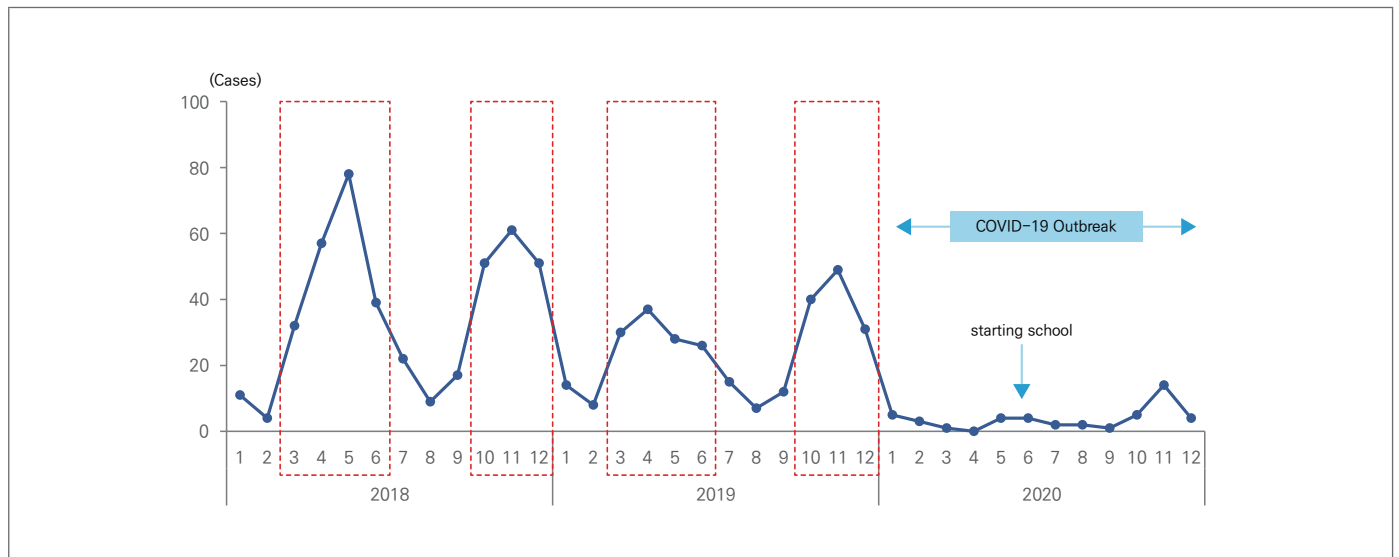


Figure 1. Number of varicella outbreaks by year and month

Table 3. Number of varicella outbreaks and cases by year and province

Unit: Number

Reporting area	2018		2019		2020		Total	
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
Seoul	50	655	22	213	2	22	74	890
Busan	21	375	21	242	2	15	44	632
Daegu	0	0	2	34	1	12	3	46
Incheon	28	310	41	426	3	18	72	754
Gwangju	23	414	12	166	3	14	38	594
Daejeon	5	111	1	16	1	3	7	130
Ulsan	4	102	0	0	1	8	5	110
Gyeonggi	84	1,283	50	629	7	48	141	1,960
Gangwon	14	188	17	180	4	18	35	386
Chungbuk	27	495	9	116	3	19	39	630
Chungnam	3	26	1	9	4	31	8	66
Jeonbuk	51	622	21	184	4	14	76	820
Jeonnam	53	791	25	527	5	55	83	1,373
Gyeongbuk	7	98	6	96	3	26	16	220
Gyeongnam	62	1,172	68	892	2	16	132	2,080
Jeju	0	0	1	13	0	0	1	13
Sejong	0	0	0	0	0	0	0	0
Total	432	6,642	297	3,743	45	319	774	10,704

Table 4. Number of varicella outbreaks and cases by year and place

Unit: Number

Category	2018		2019		2020		Total		
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Cases/Outbreak
Daycare center	61	614	52	432	16	120	129	1,166	9.0
Preschool	64	796	40	528	3	23	107	1,347	12.6
Elementary school	271	4,958	177	2,570	11	89	459	7,617	16.6
Other*	36	274	28	213	15	87	79	574	7.3
Total	432	6,642	297	3,743	45	319	774	10,704	13.8

\* Middle school, high school, university, academy, orphanage, welfare facility for the disabled, military facility, workplace, healthcare center

Table 5. Number of varicella outbreaks and cases by province

Unit: Number

Reporting area	Daycare center		Preschool		Elementary school		Other*		Total	
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
Seoul	9 (12.2)	75 (8.4)	5 (6.8)	55 (6.2)	48 (64.9)	681 (76.5)	12 (16.2)	79 (8.9)	74	890
Busan	5 (11.4)	39 (6.2)	7 (15.9)	71 (11.2)	23 (52.3)	453 (71.7)	9 (20.5)	69 (10.9)	44	632
Daegu	0 (0.0)	0 (0.0)	1 (33.3)	32 (69.6)	2 (66.7)	14 (30.4)	0 (0.0)	0 (0.0)	3	46
Incheon	11 (15.3)	101 (13.4)	7 (9.7)	128 (17.0)	46 (63.9)	454 (60.2)	8 (11.1)	71 (9.4)	72	754
Gwangju	3 (7.9)	36 (6.1)	4 (10.5)	56 (9.4)	26 (68.4)	472 (79.5)	5 (13.2)	30 (5.1)	38	594
Daejeon	1 (14.3)	12 (9.2)	0 (0.0)	0 (0.0)	5 (71.4)	115 (88.5)	1 (14.3)	3 (2.3)	7	130
Ulsan	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (80.0)	102 (92.7)	1 (20.0)	8 (7.3)	5	110
Gyeonggi	27 (19.1)	253 (12.9)	21 (14.9)	227 (11.6)	85 (60.3)	1,428 (72.9)	8 (5.7)	52 (2.7)	141	1960
Gangwon	5 (14.3)	25 (6.5)	7 (20.0)	83 (21.5)	19 (54.3)	238 (61.7)	4 (11.4)	40 (10.4)	35	386
Chungbuk	10 (25.6)	106 (16.8)	7 (17.9)	40 (6.3)	21 (53.8)	471 (74.8)	1 (2.6)	13 (2.1)	39	630
Chungnam	1 (12.5)	5 (7.6)	0 (0.0)	0 (0.0)	4 (50.0)	39 (59.1)	3 (37.5)	22 (33.3)	8	66
Jeonbuk	7 (9.2)	65 (7.9)	4 (5.3)	114 (13.9)	55 (72.4)	602 (73.4)	10 (13.2)	39 (4.8)	76	820
Jeonnam	27 (32.5)	292 (21.3)	10 (12.0)	123 (9.0)	42 (50.6)	929 (67.7)	4 (4.8)	29 (2.1)	83	1373
Gyeongbuk	1 (6.3)	13 (5.9)	1 (6.3)	34 (15.5)	10 (62.5)	134 (60.9)	4 (25.0)	39 (17.7)	16	220
Gyeongnam	22 (16.7)	144 (6.9)	33 (25.0)	384 (18.5)	68 (51.5)	1,472 (70.8)	9 (6.8)	80 (3.8)	132	2,080
Jeju	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	13 (100.0)	0 (0.0)	0 (0.0)	1	13
Sejong	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	0
<b>Total</b>	<b>129 (16.7)</b>	<b>1,166 (10.9)</b>	<b>107 (13.8)</b>	<b>1,347 (12.6)</b>	<b>459 (59.3)</b>	<b>7,617 (71.2)</b>	<b>79 (10.2)</b>	<b>574 (5.4)</b>	<b>774</b>	<b>10,704</b>

\* Middle school, high school, university, academy, orphanage, welfare facility for the disabled, military facility, workplace, healthcare center

Table 6. Distribution by volume of varicella outbreaks by year and place

Unit: Number, (%)

Category	≤ 10 cases	11–20 cases	21–40 cases	≥ 41 cases	Total
<b>Year</b>					
2018	244 (56.5)	86 (19.9)	67 (15.5)	35 (8.1)	432 (100.0)
2019	178 (59.9)	63 (21.2)	47 (15.8)	9 (3.0)	297 (100.0)
2020	37 (82.2)	8 (17.8)	0 (0.0)	0 (0.0)	45 (100.0)
<b>Place</b>					
Daycare center	91 (70.5)	24 (18.6)	13 (10.1)	1 (0.8)	129 (100.0)
Preschool	65 (60.7)	22 (20.6)	17 (15.9)	3 (2.8)	107 (100.0)
Elementary school	240 (52.3)	98 (21.4)	81 (17.6)	40 (8.7)	459 (100.0)
Other*	63 (79.7)	13 (16.5)	3 (3.8)	0 (0.0)	79 (100.0)
<b>Total</b>	<b>459 (59.3)</b>	<b>157 (20.3)</b>	<b>114 (14.7)</b>	<b>44 (5.7)</b>	<b>774 (100.0)</b>

\* Middle school, high school, university, academy, orphanage, welfare facility for the disabled, military facility, workplace, healthcare center

Table 7. Distribution by place of varicella outbreaks by period

Unit: Number, (%)

Category	Daycare center	Preschool	Elementary school	Other*	Total
≤ 21 days	76 (58.9)	46 (43.0)	172 (37.5)	47 (59.5)	341 (44.1)
22~42 days	37 (28.7)	31 (29.0)	102 (22.2)	22 (27.8)	192 (24.8)
≥ 43 days	16 (12.4)	30 (28.0)	185 (40.3)	10 (12.7)	241 (31.1)
<b>Total</b>	<b>129 (100.0)</b>	<b>107 (100.0)</b>	<b>459 (100.0)</b>	<b>79 (100.0)</b>	<b>774 (100.0)</b>

\* Middle school, high school, university, academy, orphanage, welfare facility for the disabled, military facility, workplace, healthcare center