

## Abstract

## Characteristics of reported malaria cases, 2020

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Malaria is considered one of the most important acute febrile diseases worldwide. The World Health Organization (WHO)'s Global Technology Strategy for Malaria(2016-2030) has been developed with the aim of helping countries to reduce the incidence and mortality of malaria worldwide by more than 90% by 2030. However, many agree that the shift in focus to identify and treat COVID-19 impacted ongoing efforts to control other infectious diseases, such as malaria. In line with the WHO's global efforts to eliminate malaria, Korea established and promoted a Malaria Re-Elimination 5-Year Plan (2019-2023) and implemented various strategies such as patient monitoring, early diagnosis and treatment, and vector management.

In 2020, the number of malaria patients in Korea was 385; down 31.1% from 2019 when there were 559 patients. The number of indigenous cases was 356 (92.5%) and 340 (95.5%) of them occurred from May until October. In addition, the number of imported cases was 29 (7.5%) which marked a 60.8% year-on-year reduction, which, this report hypothesized, was most likely due to the decrease in overseas travel due to the COVID-19 pandemic.

By gender and age, at 315 male cases (81.8%), the number of male that had malaria was 4.5 times higher than the number of female, and the most frequent occurrence was among individuals in their 20s (117, 30.4%). By indigenous cases, the infected areas were Gyeonggi Province 64.6% (230), Incheon 17.4% (62) and Gangwon Province 8.4% (30). The most common symptoms were fever (96.1%), followed by chills (77.4%), sweats (50.9%), and headaches (46.2%). Of them, 84 cases were soldiers serving or served near the demilitarized zone(DMZ), while 301 cases were civilians. The civilian cases were higher than those of military.

In Korea, malaria outbreaks resumed in 1993, and there were about 4,000 patients per year until 2000. The incidence of patients decreased to around 500 in recent 5 years due to continuous efforts to reduce malaria. In 2020, the lowest incidence was reported since the malaria outbreaks resumed in 1993. This may be related to the COVID-19 outbreak situation which reduced overseas travel and the policy direction of COVID-19, such as social distancing. This report recommended continuous organic cooperation and rapid response measures of the KDCA, local governments, and front-line medical institutions.

**Keywords:** Malaria, Elimination, Indigenous case, Imported case, Patient management

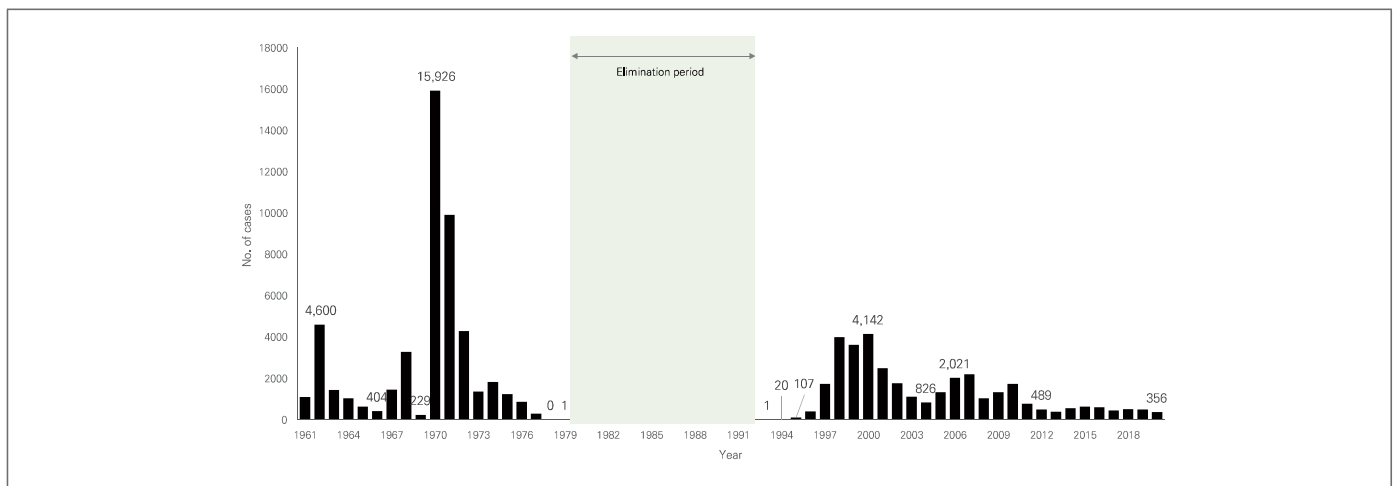


Figure 1. Number of malaria cases in Korea, 1961–2020

Table 1. General Characteristics of malaria cases in Korea, 2019–2020

Category	2020	2019	Year on year (%)
	N (%)	N (%)	
<b>Total</b>	385 (100.0)	559 (100.0)	-31.1
<b>Gender</b>			
Male	315 (81.8)	444 (79.4)	-29.1
Female	70 (18.2)	115 (20.6)	-39.1
<b>Age (yr)</b>			
< 20	20 (5.2)	31 (5.5)	-35.5
20–29	117 (30.4)	169 (30.2)	-30.8
30–39	56 (14.5)	92 (16.5)	-39.1
40–49	70 (18.2)	97 (17.4)	-27.8
50–59	70 (18.2)	84 (15.0)	-16.7
60–69	30 (7.8)	52 (9.3)	-42.3
≥ 70	22 (5.7)	34 (6.1)	-35.3
<b>Occupation (Risk group)</b>			
Civilian	301 (78.2)	437 (78.2)	-31.1
Veteran	44 (11.2)	51 (9.1)	-15.7
Soldier	41 (10.6)	71 (12.7)	-42.3
<b>Infected country</b>			
Indigenous	356 (92.5)	485 (86.8)	-26.6
Imported	29 (7.5)	74 (13.2)	-60.8
<b>Plasmodium spp.</b>			
<i>P. vivax</i>	358 (92.9)	501 (89.6)	-28.5
<i>P. falciparum</i>	24 (6.2)	57 (10.2)	-57.9
<i>P. ovale</i>	1 (0.3)	1 (0.2)	0.0
<i>P. malariae</i>	1 (0.3)	0 (0.0)	-
Unknown	1 (0.3)	0 (0.0)	-

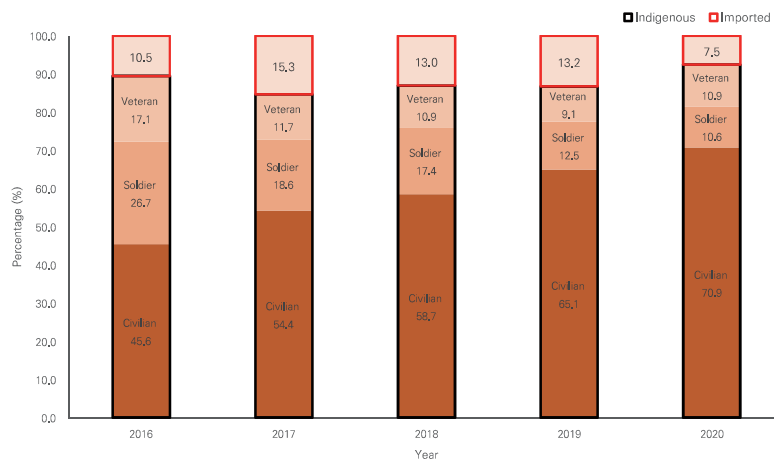


Figure 2. Proportion of malaria cases by occupation in Korea, 2016–2020

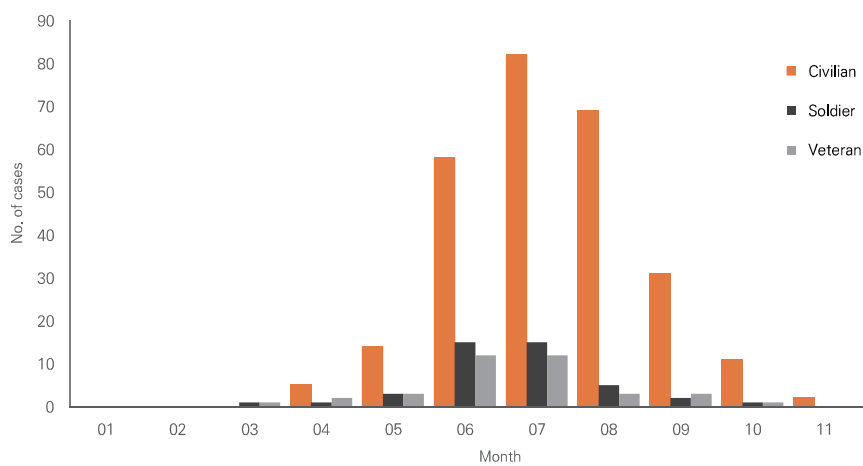


Figure 3. Monthly distribution of indigenous malaria cases by occupation, 2020

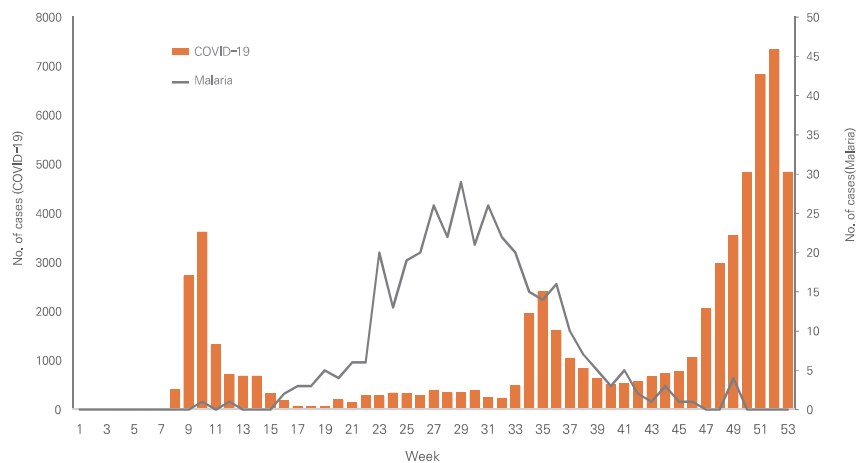


Figure 4. Weekly distribution of Malaria/ COVID-19 cases, 2020

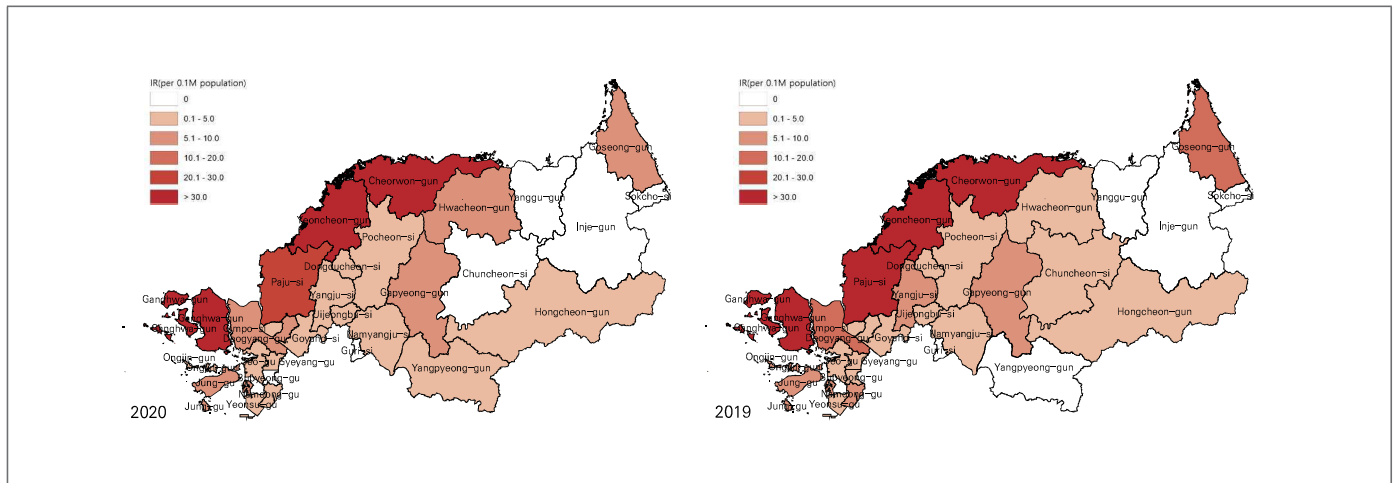


Figure 5. ncidence (per 100,000 population) of indigenous malaria cases, 2019–2020

Table 2. Infected areas by region of indigenous malaria cases, 2019–2020

Region	2020		2019	
	N(%)	IR	N(%)	IR
<b>Total</b>	356 (100.0)	0.69	485 (100.0)	0.94
<b>Gyeonggi</b>	230 ( 64.6)	1.72	314 ( 64.7)	2.39
Paju-si	93 ( 26.1)	<b>20.22</b>	155 ( 32.0)	<b>34.22</b>
Yeoncheon-gun	41 ( 11.5)	<b>93.89</b>	41 ( 8.5)	<b>92.70</b>
Gimpo-si	30 ( 8.4)	6.58	50 ( 10.3)	11.62
Ilsandong-gu, Goyang-si	16 ( 4.5)	5.36	9 ( 1.9)	3.03
Ilsanseo-gu, Goyang-si	14 ( 3.9)	4.63	15 ( 3.1)	5.00
Deogyang-gu, Goyang-si	7 ( 2.0)	1.48	12 ( 2.5)	2.62
Pocheon-si	7 ( 2.0)	4.74	5 ( 1.0)	3.34
Gapyeong-gun	6 ( 1.7)	9.62	6 ( 1.2)	9.57
Uijeongbu-si	6 ( 1.7)	1.31	3 ( 0.6)	0.67
Namyangju-si	5 ( 1.4)	0.71	4 ( 0.8)	0.58
Yangju-si	3 ( 0.8)	1.33	13 ( 2.7)	5.92
Dongducheon-si	1 ( 0.3)	1.06	1 ( 0.2)	1.05
Yangpyeong-gun	1 ( 0.3)	0.85	0 ( 0.0)	0.00
<b>Incheon</b>	62 ( 17.4)	2.1	98 ( 20.2)	3.32
Ganghwa-gun	31 ( 8.7)	<b>44.8</b>	35 ( 7.2)	<b>50.70</b>
Seo-gu	9 ( 2.5)	1.66	23 ( 4.7)	4.25
Jung-gu	9 ( 2.5)	6.55	13 ( 2.7)	10.09
Yeonsu-gu	5 ( 1.4)	1.33	9 ( 1.9)	2.52
Gyeyang-gu	3 ( 0.8)	1	6 ( 1.2)	1.95
Namdong-gu	2 ( 0.6)	3.15	6 ( 1.2)	1.12
Michuhol-gu	2 ( 0.6)	0.38	1 ( 0.2)	0.24
Ongjin-gun	1 ( 0.3)	4.88	2 ( 0.4)	9.61
Bupyeong-gu	0 ( 0.0)	—	3 ( 0.6)	0.58
<b>Gangwon</b>	30 ( 8.4)	1.95	25 ( 5.2)	1.62
Cheorwon-gun	25 ( 7.0)	<b>55.38</b>	18 ( 3.7)	<b>39.13</b>
Goseong-gun	2 ( 0.6)	7.41	4 ( 0.8)	14.44
Hwacheon-gun	2 ( 0.6)	8.04	1 ( 0.2)	4.00
Hongcheon-gun	1 ( 0.3)	1.45	1 ( 0.2)	1.44
Chuncheon-si	0 ( 0.0)	—	1 ( 0.2)	0.36
<b>Unknown</b>	34 ( 9.6)	—	48 ( 9.9)	—

\*IR; Incidence rate(Per 0.1M people), KOSIS (Korean Statistical Information Service)

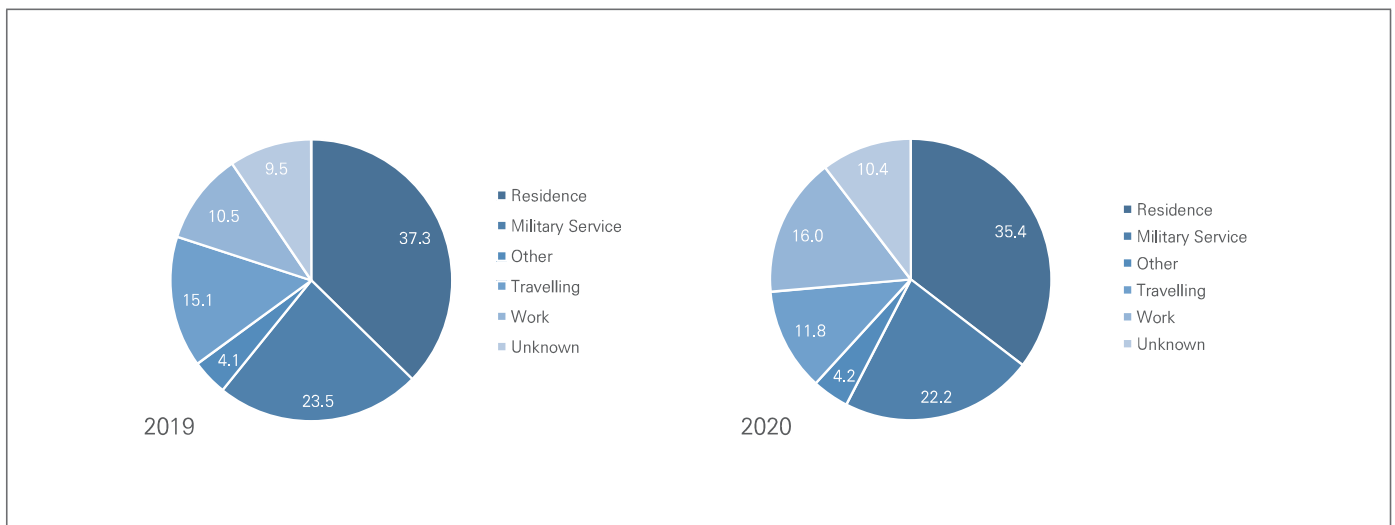


Figure 6. Risk factors of infection among indigenous malaria cases, 2019–2020

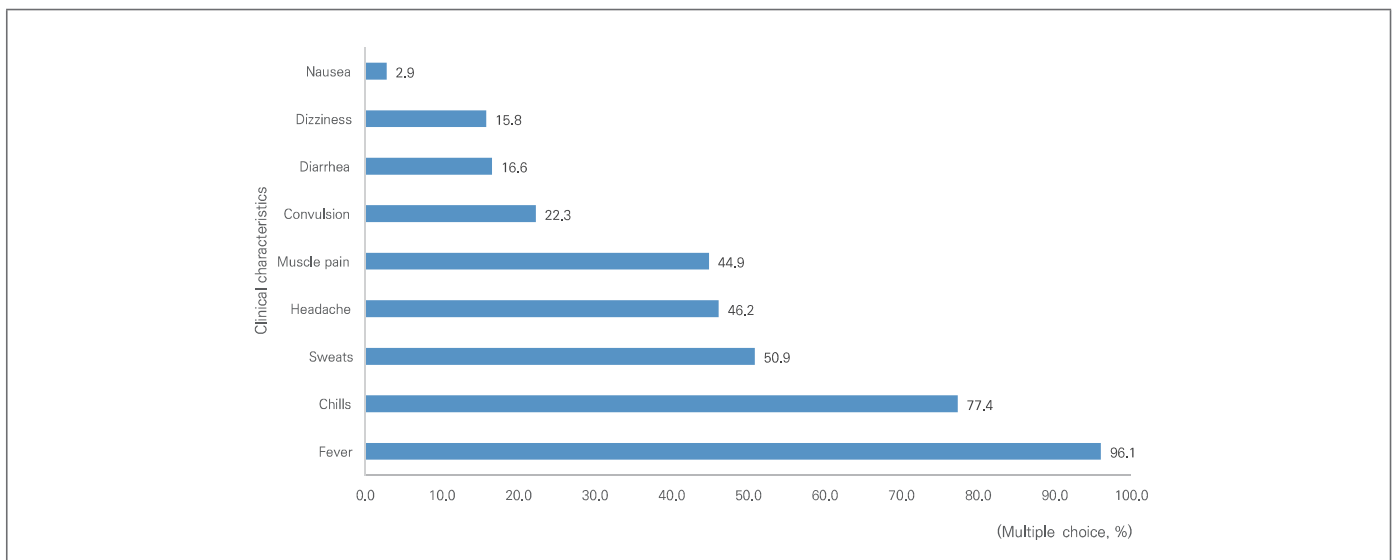


Figure 7. Clinical characteristics of malaria cases, 2020

Table 3. Time interval between onset of symptom and diagnosis among malaria cases, 2019–2020

Category	No. cases		From Onset to Visit Dr.		From Visit Dr. to diagnosis		From Onset to diagnosis	
	2019	2020	2019	2020	2019	2020	2019	2020
<b>Total</b>	485	356	3.0	3.0	1.0	0.0	5.0	5.0
<b>Civilians</b>								
Risk area	255	239	3.0	3.0	0.0	0.0	4.0	5.0
Non-risk area	109	33	4.0	3.0	3.0	0.0	8.0	4.0
<b>Veteran</b>	51	43	3.0	5.0	4.0	0.0	9.0	7.0
<b>Soldier</b>	70	41	3.5	2.0	2.0	0.0	5.0	4.0