

AIR/DROPLET- BORNE DISEASES



Airborne transmission occurs by dissemination of suspended particles five micrometres or smaller in diameter. Droplets can be formed when a person coughs, sneezes or talks, or during administration of drugs via nebuliser or invasive procedures such as suctioning and bronchoscopy, and transmission occurs when they are propelled a short distance (within a metre) through air and deposited on the host's mucous membranes.

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HAEMOPHILUS INFLUENZAE TYPE B DISEASE

Haemophilus influenzae type b (Hib) is a bacterium (gram-negative coccobacillus) that causes severe illnesses such as pneumonia, bacteraemia and meningitis. The mode of transmission is by inhalation of respiratory droplets or direct contact with respiratory tract secretions of infected persons. Hib disease is vaccine-preventable.

In 2016, there were two cases of Hib disease reported compared to three cases in 2015 (Figure 2.1). The two cases were laboratory-confirmed with positive blood cultures. The two separate cases were aged one year and 58 years respectively, and were of Malay ethnicity (Table 2.1 and 2.2). The two cases were classified as indigenous cases (Table 2.3).

Figure 2.1
Weekly distribution of reported Hib cases, 2015-2016

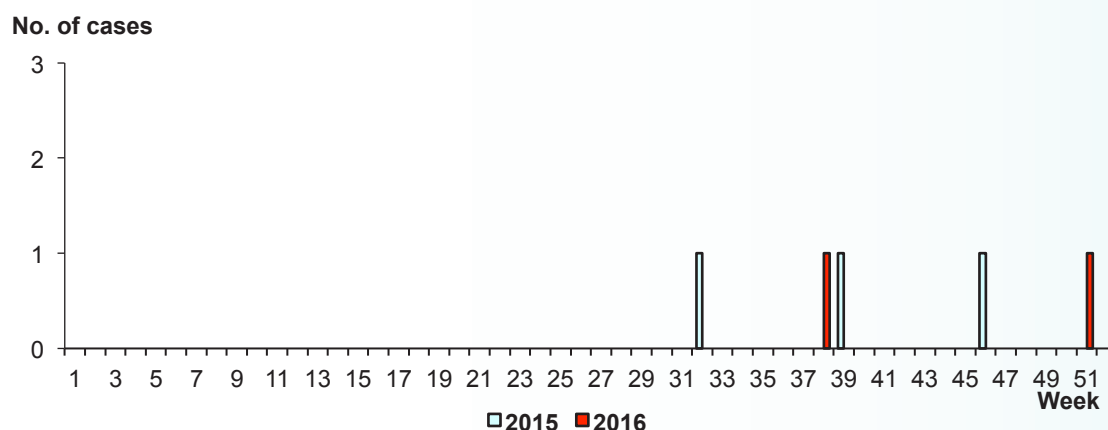


Table 2.1
Age-gender distribution and age-specific incidence rate of reported Hib cases, 2016

Age group	Male	Female	Total	%	Incidence rate per 100,000 population*
0-4	1	0	1	50	0.4
5-14	0	0	0	0	0.0
15-24	0	0	0	0	0.0
25-34	0	0	0	0	0.0
35-44	0	0	0	0	0.0
45-54	0	0	0	0	0.0
55-64	1	0	1	50	0.2
65+	0	0	0	0	0.0
Total	2	0	2	100	0.0

*Rates are based on 2016 estimated mid-year population.
(Source: Singapore Department of Statistics)

Table 2.2
Ethnic-gender distribution and ethnic-specific incidence rate of reported Hib cases, 2016

	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	0	0	0	0	0.0
Malay	2	0	2	100	0.4
Indian	0	0	0	0	0.0
Others	0	0	0	0	0.0
Foreigners	0	0	0	0	0.0
Total	2	0	2	100	0.0

*Rates are based on 2016 estimated mid-year population.
(Source: Singapore Department of Statistics)

Table 2.3
Total number of notifications* received for Hib, 2012-2016

Age group	2012		2013		2014		2015		2016	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	0	0	0	0	1	0	0	0	1	0
5-14	0	0	0	0	0	1	0	0	0	0
15-24	0	0	0	0	0	0	0	0	0	0
25-34	0	0	0	0	1	0	0	0	0	0
35-44	0	0	0	0	0	0	0	0	0	0
45-54	0	0	2	0	1	0	0	0	0	0
55-64	0	0	3	1	0	0	0	0	1	0
65+	1	0	4	0	2	0	3	0	0	0
Total	1	0	9	1	5	1	3	0	2	0

*Excluded tourists and foreigners seeking medical treatment in Singapore.

HAND, FOOT AND MOUTH DISEASE

Hand, foot and mouth disease (HFMD) is a common childhood viral disease characterised by brief prodromal fever, followed by pharyngitis, mouth ulcers and rash on the hands and the feet. The disease is commonly mild and self-limiting. The common causative agents for HFMD are the coxsackieviruses type A, echovirus, and enterovirus A71 (EV-A71). HFMD can be transmitted from person to person through the faecal-oral or respiratory route.

A total of 42,154 cases of HFMD were reported in 2016, an increase of 49.4% compared to 28,216 cases reported in 2015 (Figure 2.2). There were no cases with severe complications due to HFMD reported in 2016.

The incidence rate was highest in the 0-4 years age group, with an overall male to female ratio of 1.2:1 (Table 2.4). Among the three major ethnic groups, Malays had the highest incidence rate, followed by Chinese and Indians (Table 2.5). No HFMD deaths were reported in 2016.

Viral isolation and PCR of EV 71 and other enteroviruses were carried out on samples collected at the KK Women's and Children's Hospital (KKH), National University Hospital and sentinel GP clinics. Of the isolates that were tested positive, the majority was coxsackieviruses type A (14.6%), followed by EV71 (0.6%). Among the coxsackieviruses, CA16 (38.8%) was the predominant serotype, followed by CA6 (32.0%).

Figure 2.2
Weekly distribution of reported HFMD cases, 2015-2016

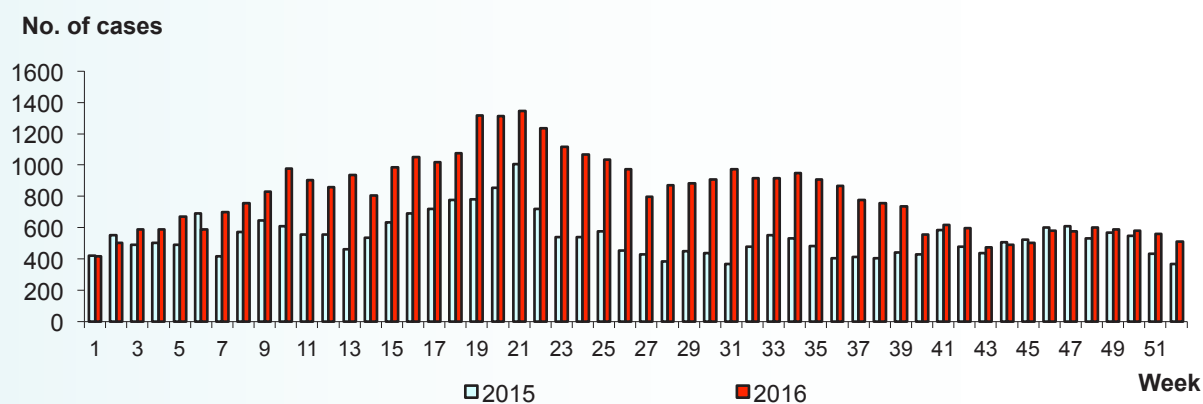


Table 2.4
Age-gender distribution and age-specific incidence rate of reported HFMD[^], 2016

Age group	Male	Female	Total	%	Incidence rate per 100,000 population*
0-4	14,722	11,948	26,670	63.3	11,453.9
5-14	6,009	4,642	10,651	25.3	2,290.7
15-24	753	710	1,463	3.5	197.1
25-34	755	941	1,696	4.0	133.8
35-44	758	550	1,308	3.1	130.5
45-54	153	114	267	0.6	35.3
55+	54	40	94	0.2	15.6
Total	23,204	18,945	42,149	100	751.7

[^]Excluded 5 tourists.

*Rates are based on 2016 estimated mid-year population.
(Source: Singapore Department of Statistics)

Table 2.5
Ethnic-gender distribution and ethnic-specific incidence rate of reported HFMD[^], 2016

	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	15,522	12,873	28,395	67.4	971.4
Malay	3,670	2,962	6,632	15.7	1,261.1
Indian	863	709	1,572	3.7	440.5
Others	854	655	1,509	3.6	1,182.4
Foreigners	2,295	1,746	4,041	9.6	241.4
Total	23,204	18,945	42,149	100	751.7

[^]Excluded 5 tourists.

*Rates are based on 2016 estimated mid-year population.
(Source: Singapore Department of Statistics)

Institutional outbreaks

There were 2,547 reported outbreaks of HFMD in 2016, each involving two or more cases. Table 2.6 gives a breakdown of HFMD outbreaks at various educational institutions by attack rate. One HFMD outbreak cluster is discussed below.

Since 2010, additional measures were introduced to curb the HFMD transmission in educational institutions. Childcare centres or kindergartens with prolonged HFMD transmission had their names published on the MOH website and were subsequently closed for ten days if disease transmission was prolonged for more than 16 days. These measures continued to be enforced in 2016 with public education enhanced.

Table 2.6
Outbreaks of HFMD in childcare centres/kindergartens, 2016

Attack rate (%)	Childcare centres	Kindergartens
<10	1,675	435
10-20	311	13
21-30	83	-
31-40	19	1
41-50	10	-
>50	-	-
Total	2,098	449

Outbreak at a Bedok childcare centre

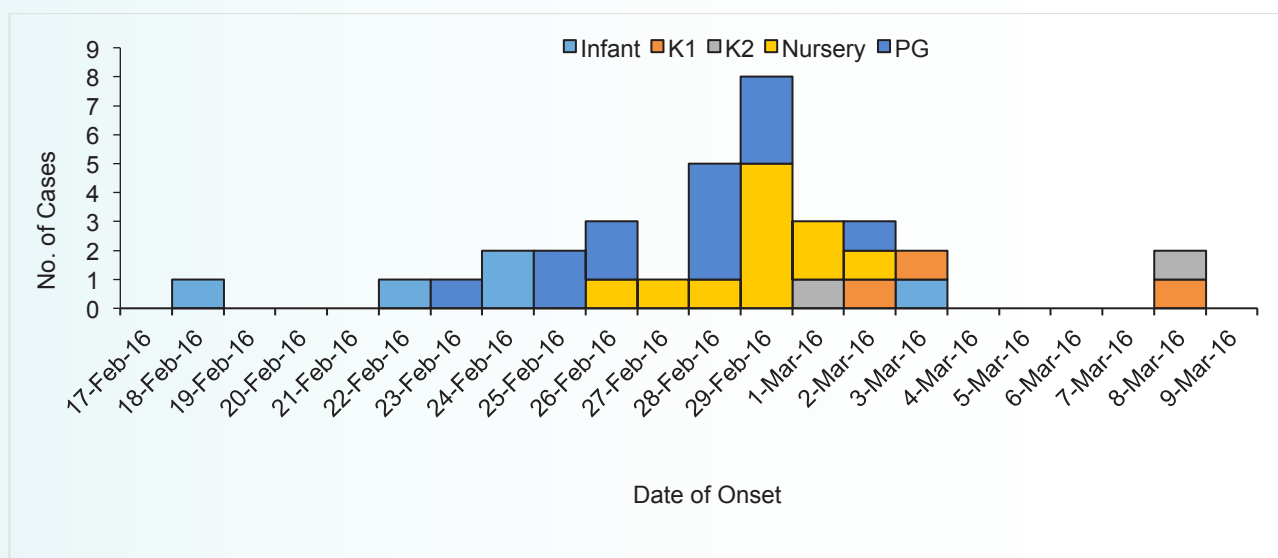
An outbreak of HFMD involving 34 children aged between one and five years occurred between 18 February and 8 March 2016 in a childcare centre at Bedok. At the time of the outbreak, the centre had 19 full-time staff and 83 children in five classes: Infant, Nursery, Playgroup, Kindergarten 1 (K1) and Kindergarten 2 (K2).

The class-specific attack rates ranged from 15.4% to 57.9% (Table 2.7). The outbreak started with an infant who developed symptoms on 18 February 2016. The infection subsequently spread amongst other children. The last reported case was on 8 March 2016 (Figure 2.3).

Table 2.7
Attack rates of HFMD in a Bedok childcare centre,
18 February-8 March 2016

Class category	No. enrolled			No. affected and attack rates					
	Male	Female	Total	Male	%	Female	%	Total	%
Infant	9	6	15	3	33.3	2	33.3	5	33.3
Nursery	7	12	19	3	42.9	8	66.7	11	57.9
Playgroup	12	13	25	8	66.7	5	38.5	13	52.0
K1	4	7	11	1	25.0	2	28.6	3	27.3
K2	7	6	13	2	28.6	0	0.0	2	15.4
Total	39	44	83	17	43.6	17	38.6	34	41.0

Figure 2.3
Time distribution of 34 cases of HFMD in a Bedok childcare centre,
18 February-8 March 2016



INFLUENZA

Influenza is an acute viral disease of the respiratory tract characterised by fever and symptoms such as sore throat, cough, coryza, headache and myalgia. It may be complicated by pneumonia, particularly in high-risk patients such as those with co-morbidities. It is spread from person to person mainly through infectious respiratory droplets and secretions released during coughing and sneezing.

The causative agent is the influenza virus and three types of influenza virus (A, B, C) are recognised. The Influenza type A viruses include two subtypes (H1N1 and H3N2) that infect humans and have been associated with pandemics and widespread epidemics. Influenza type B is occasionally associated with regional epidemics, and influenza type C is associated with sporadic cases and minor localised outbreaks. Diagnosis is based on the clinical recognition of influenza-like illness with or without laboratory confirmation and strain characterisation.

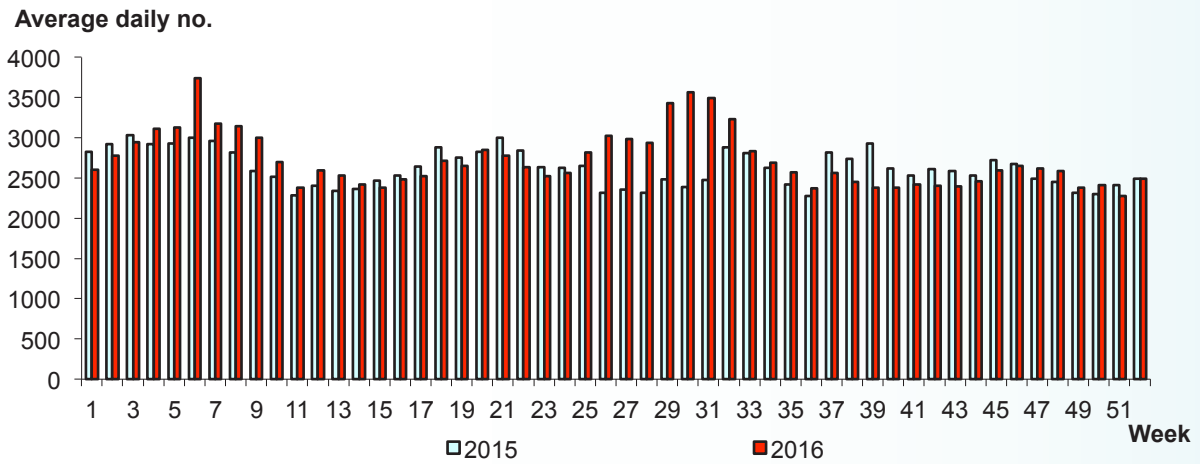
In temperate and cold climates, influenza reaches peak incidence in winter. As the northern and southern Hemispheres have winter at different times of the year, there are two influenza seasons each year: December-March in the Northern Hemisphere; and June-September in the Southern Hemisphere.

In tropical and subtropical areas, influenza epidemics may occur twice a year or even throughout the year. In Singapore, influenza viruses circulate year-round, with a bimodal increase in incidence observed in April-July and November-January.

The weekly attendance for acute respiratory infections (ARI) at polyclinics and public hospital emergency departments is routinely monitored as a proxy indicator for influenza activity (Note: ARI represents a mixture of respiratory illnesses and the proportion of influenza cases presenting with ARI varies with the level of influenza activity). The weekly number of admissions due to ARI at public hospitals is also monitored.

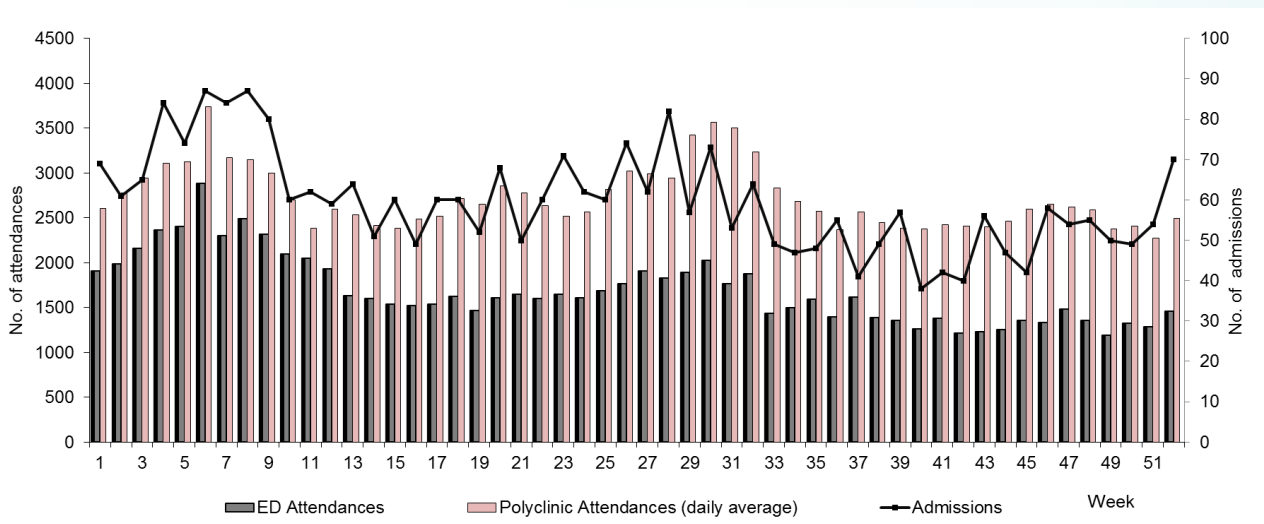
There were a total of 753,167 attendances at polyclinics for ARI in 2016, an increase of 5.8% compared to 712,082 seen in 2015. No clear seasonal pattern for ARI was observed (Figure 2.4).

Figure 2.4
Weekly distribution of ARI attendances at polyclinics, 2015-2016



An annual total of 88,099 ARI cases were seen at the emergency departments of public hospitals in 2016, an increase of 2.5% compared to 85,916 cases reported in 2015. The highest average weekly ARI attendances was observed in E-week 6 at 2,833. In addition, ARI admissions peaked at 87 cases in E-weeks 6 and 8 (Figure 2.5).

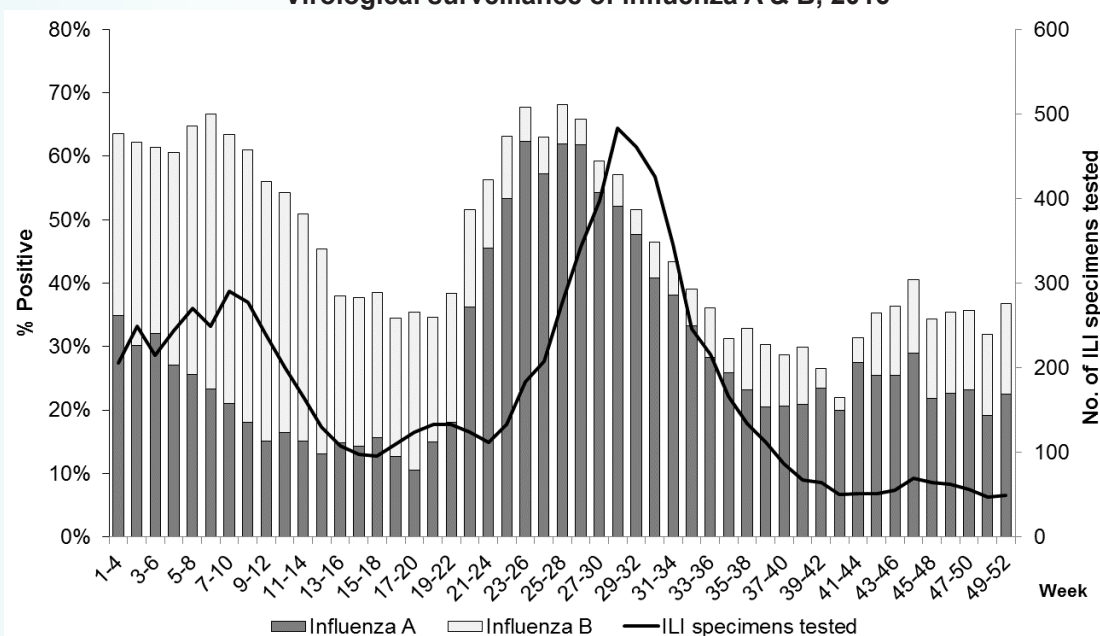
Figure 2.5
Weekly polyclinics attendances and hospitals emergency departments attendances, admissions for acute respiratory infections, 2016



Virological surveillance of influenza viruses was carried out on throat and/or nasopharyngeal specimens obtained from polyclinics, hospitals and sentinel private clinics throughout the year. The typing, subtyping and isolation of influenza viruses was carried out at the National Public Health Laboratory (NPHL) and at designated hospital laboratories. Further genetic analysis and antigenic characterisation of selected samples was also done by NPHL and the WHO Collaborating Centre for Reference and Research on Influenza, Melbourne, Australia.

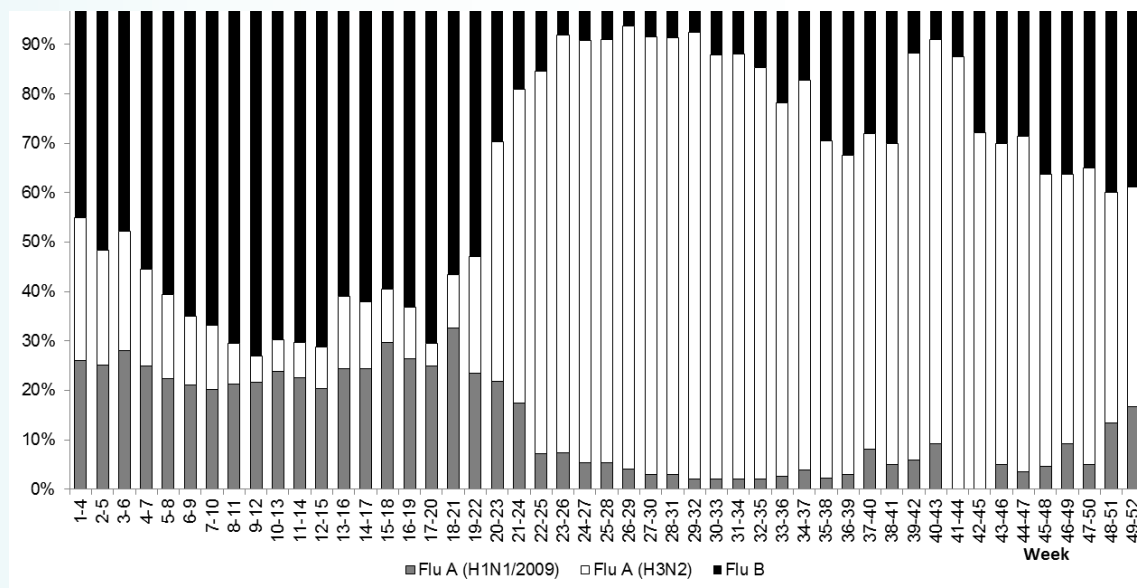
The 4-weekly moving average of the proportion of samples from patients in polyclinics and sentinel private clinics with influenza-like illness (ILI) which were positive for influenza viruses is shown in Figure 2.6. Higher levels of influenza activity were observed for the 4-weekly moving average between E-weeks 20-23 and 29-32, with a range of 51.6% to 68.1%. Influenza activity peaked in E-weeks 25-28 with 68.1% of ILI samples testing positive for influenza viruses. 91.0% of the positive samples in E-weeks 25-28 were influenza A viruses. Of these, 94.1% were of the influenza A(H3N2) subtype.

Figure 2.6
Virological surveillance of influenza A & B, 2016



In 2016, 51.6% of all ILI samples tested positive for influenza viruses. Of the positive samples, 65.8% tested positive for influenza A viruses, of which 80.5% were of the influenza A(H3N2) subtype. Between E-weeks 4-7 and 19-22, influenza B predominated among the influenza viruses, co-circulating with lower levels of influenza A(H1N1)pdm09 and influenza A(H3N2). Influenza A(H3N2) virus exhibited strong predominance in Singapore for the rest of 2016 (Figure 2.7).

Figure 2.7
Influenza typing results, 2016



In 2016, Influenza A(H1N1)pdm09 viruses from phylogenetic clades 6B.1 and 6B.2 co-circulated from January to March, with 6B.1 viruses dominating and subsequently replacing all 6B.2 viruses. Viruses belonging to clades 6B.1 were antigenically related to the current vaccine strain, A/Michigan/45/2014. Influenza A(H3N2) viruses were grouped in phylogenetic clades 3C.2a and antigenically related to the current vaccine strain, A/Hong Kong/4801/2014. Influenza B viruses of the B/Victoria/2/87 and the B/Yamagata/16/88 lineages co-circulated, with the former dominating from January to May and the latter dominating from June to December. Circulating viruses belonging to B/Victoria/2/87 lineage fell within phylogenetic clade 1A and remained antigenically similar to B/Brisbane/60/2008, the recommended vaccine strain for the 2017-2018 northern hemisphere vaccine. Circulating viruses belonging to the B/Yamagata16/88 lineage were antigenically similar to B/Phuket/3073/2013, which is recommended for quadrivalent vaccine compositions.

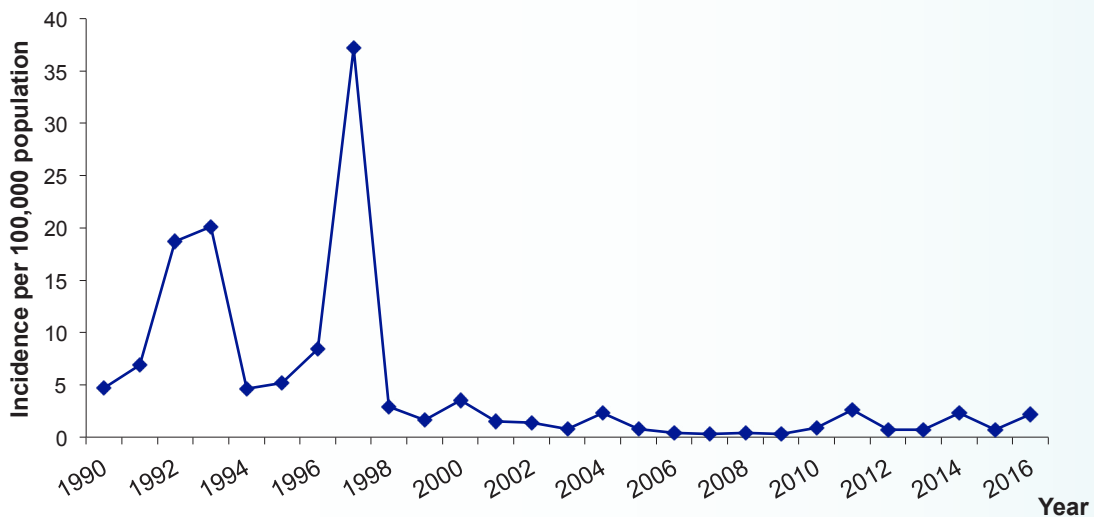
Over 230 isolates, including influenza A(H1N1)pdm09, A(H3N2) and B viruses, were analysed for the resistance to neuraminidase inhibitors oseltamivir, peramivir, laninamivir and zanamivir. Resistance to oseltamivir was detected in one influenza A(H1N1)pdm09 isolate.

MEASLES

Measles is an acute, highly communicable viral disease caused by the measles virus, a member of the genus *Morbillivirus* of the family *Paramyxoviridae*. In measles, a maculopapular rash shortly follows a fever, and is often accompanied by coryza, cough and conjunctivitis. Complications include pneumonia and encephalitis. The mode of transmission is airborne by droplet spread, or direct contact with the nasal or throat secretions of an infected person.

In Singapore, the number of reported measles cases has rapidly declined with the introduction of compulsory measles vaccination in August 1985. In 1992 and 1997, there was an increase in the number of reported cases (Figure 2.8). All age groups were affected and as a result, the “catch-up” immunisation initiative was implemented in July-November 1997 and the two-dose MMR vaccination regime was implemented in January 1998. The incidence of measles has remained at a low level since then.

Figure 2.8
Incidence of reported measles cases, 1990-2016



A total of 136 laboratory confirmed cases of measles were reported in 2016 compared to 42 cases reported in 2015 (Figure 2.9). The highest incidence rate was observed in children under the age of one year (Tables 2.8 and 2.9). Among the three major ethnic groups, Malays had the highest incidence rate, followed by Chinese and Indians (Table 2.10).

Figure 2.9
Weekly distribution of reported measles cases, 2015-2016

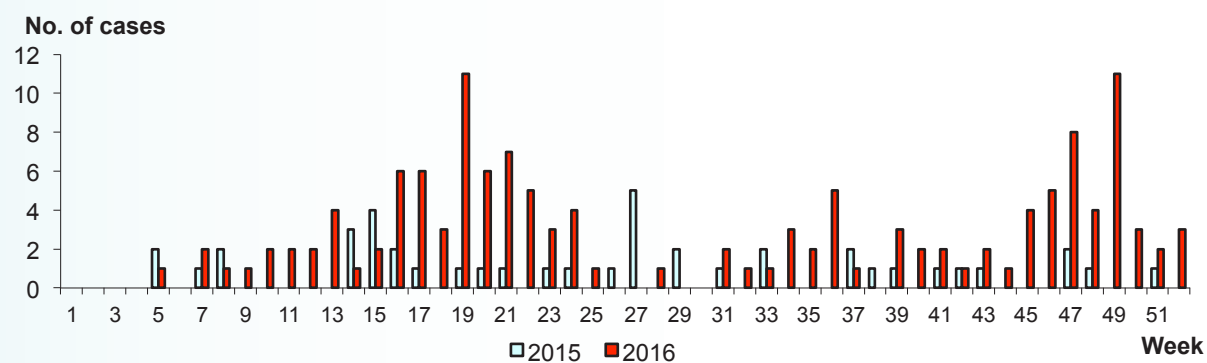


Table 2.8
Total number of notifications* received for measles, 2012-2016

Age group	2012		2013		2014		2015		2016	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
< 6 mths	1	0	2	1	4	0	1	0	10	0
6 mths-< 1yr	2	0	12	3	21	7	9	0	33	2
1-4	9	0	9	5	31	9	6	2	27	3
5-9	3	0	0	4	2	0	1	0	11	0
10-14	1	0	1	0	0	0	1	0	0	0
15-24	3	0	1	0	4	2	2	1	1	0
25-34	7	4	2	0	20	8	4	6	16	1
35-44	4	2	4	0	14	1	5	2	17	2
45-54	0	0	0	0	3	2	0	0	3	0
55+	1	0	0	0	0	0	0	0	0	0
Total	31	6	31	13	99	29	29	11	118	8

*Excluded tourists and foreigners seeking medical treatment in Singapore

Table 2.9
Age-gender distribution and age-specific incidence rate of reported measles cases[^], 2016

Age group	Male	Female	Total (%)	%	Incidence rate per 100,000 population*
< 6 mths	3	7	10	7.9	108.3
6 mths-< 1yr	19	16	35	27.8	
1-4	19	11	30	23.8	15.7
5-9	7	4	11	8.7	4.7
10-14	0	0	0	0	0
15-24	0	1	1	0.8	0.1
25-34	5	12	17	13.5	1.3
35-44	8	11	19	15.1	1.9
45-54	2	1	3	2.4	0.4
55+	0	0	0	0	0
Total	63	63	126	100	2.2

[^]Excluded 10 foreigners seeking medical treatment in Singapore.

*Rates are based on 2016 estimated mid-year population.

(Source: Singapore Department of Statistics)

Table 2.10
Ethnic-gender distribution and ethnic-specific incidence rate of reported measles cases[^], 2016

	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	26	23	49	38.9	1.7
Malay	23	22	45	35.7	8.6
Indian	2	2	4	3.2	1.1
Others	2	3	5	3.9	3.9
Foreigner	10	13	23	18.3	1.4
Total	63	63	126	100	2.2

[^]Excluded 10 foreigners seeking medical treatment in Singapore

*Rates are based on 2016 estimated mid-year population.

(Source: Singapore Department of Statistics)

WHO classification of measles cases

A total of 139 laboratory confirmed measles cases were reported to WHO Western Pacific Regional Office in 2016. During this period, 71.9% of cases were sporadic and the rest were small clusters. The source of infection and the method of confirmation based on WHO classification are shown in Table 2.11.

Of the 139 measles cases, 121 were classified as locally acquired and 18 were imported. The majority of imported cases originated from Indonesia, followed by Vietnam (Table 2.12).

Table 2.11
WHO classification of measles cases[^], 2016

Source#	Confirmed measles cases			
	Laboratory confirmed		Epidemiological linkage	Total
	Respiratory specimen	Blood specimen		
Endemic	0	0	0	0
Unknown	28	6	0	34
Imported	8	8	0	16
Import-related	0	89 (3*)	0	89
Total	36	103 (3*)	0	139

#Source – whether the source of virus was imported, import-related, endemic or unknown, as extracted from description provided by WHO in the WHO monthly summary excel spreadsheet.

- **Imported:** A case exposed outside the region or country during the 7-21 days prior onset to rash and supported by epidemiological or virological evidence, or both.
- **Import-Related:** A locally acquired infection occurring as part of a chain of transmission originating from an imported case as supported by epidemiological or virological evidence, or both.
- **Endemic:** Laboratory or epidemiologically-linked confirmed cases of measles resulting from endemic transmission of measles virus.
- **Unknown:** A confirmed case for which an epidemiologically or virological link to importation or to endemic transmission cannot be established after a thorough investigation.

* Persons who had both respiratory and blood samples collected.

[^] Reporting was based on the date of onset of rashes from 1 Jan - 31 Dec 2016.

Table 2.12
Distribution of measles cases by genotype, 2016

Genotypes	Classification			
	Local	Imported	Total	Country of importation (No. of persons)
B3	34	3	37	Bangladesh (1) Republic of China, Taiwan (1) Vietnam (1)
D8	51	6	57	Indonesia (6)
D9	8	0	8	-
H1	0	1	1	China (1)
Genotyping not performed	28	8	36	Indonesia (5) Malaysia (1) Myanmar (1) Vietnam (1)
Total	121	18	139	

MENINGOCOCCAL INFECTION

Meningococcal meningitis is an acute bacterial disease, characterised by sudden onset of fever, intense headache, nausea and often vomiting and a stiff neck. It is often accompanied by a petechial rash, and can progress to sepsis and death. The causative agent is *Neisseria meningitidis* with serotype groups A, B, C, Y, W-135, X and Z. The mode of transmission is via direct contact, including respiratory droplets from nose and throat of infected persons.

In 2016, there were five cases of meningococcal infection reported compared to six cases in 2015 (Tables 2.13 and 2.14). All the cases were laboratory-confirmed with positive blood or cerebral spinal fluid culture (Table 2.15).

Table 2.13
Total number of notifications* received for meningococcal infection, 2012-2016

Age group	2012		2013		2014		2015		2016	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	0	0	1	0	3	0	2	0	0	0
5-14	0	0	0	0	0	0	0	0	0	0
15-24	0	0	0	0	0	0	2	0	2	0
25-34	0	0	0	0	1	0	2	0	1	0
35-44	0	0	0	1	1	0	0	0	0	1
45-54	0	0	0	0	2	0	0	0	0	0
55-64	0	0	1	0	2	0	0	0	0	0
65+	0	0	0	0	0	0	0	0	0	1
Total	0	0	2	1	9	0	6	0	3	2

*Excluded tourists and foreigners seeking medical treatment in Singapore.

Table 2.14

Age-gender distribution and age-specific incidence rate of reported meningococcal infection cases, 2016

Age group	Male	Female	Total	%	Incidence rate per 100,000 population*
0-4	0	0	0	0	0
5-14	0	0	0	0	0
15-24	2	0	2	40.0	0.3
25-34	1	0	1	20.0	0.1
35-44	1	0	1	20.0	0.1
45-54	0	0	0	0	0
55-64	0	0	0	0	0
65+	1	0	1	20.0	0.2
Total	5	0	5	100	0.1

*Rates are based on 2016 estimated mid-year population.
(Source: Singapore Department of Statistics)

Table 2.15

Epidemiological data of five reported meningococcal infection cases, 2016

Gender	Age	Ethnic group	Causative agent	Status
M	20 years	Chinese	<i>Neisseria meningitides</i> Grp B	Recovered
M	20 years	Chinese	<i>Neisseria meningitides</i> Grp B	Recovered
M	27 years	Chinese	<i>Neisseria meningitides</i> Grp B	Recovered
M	40 years	Foreigner	<i>Neisseria meningitides</i> Grp B	Recovered
M	65 years	Chinese	<i>Neisseria meningitides</i> Grp W135	Recovered

MUMPS

Mumps or infectious parotitis is an acute viral disease characterised by fever, swelling and tenderness of one or more salivary glands. Complications include orchitis, meningitis and deafness. The mumps virus, a member of the genus *Paramyxovirus*, is antigenically related to the parainfluenza viruses. The mode of transmission is airborne spread via infected respiratory droplets or by direct contact with the saliva of an infected person.

The incidence of mumps in Singapore increased five-fold between 1998 and 1999, from 1,183 cases to 6,384 cases. Children below age 15 were the most affected age group. This increase was due to the low protective efficacy of vaccines containing the Rubini strain, which had been used between the years 1993-1995. Following this resurgence, a more efficacious vaccine replaced the Rubini strain-containing vaccine. Since then, the annual incidence of mumps has declined rapidly (Figure 2.10).

Figure 2.10
Incidence of reported mumps cases, 1990-2016

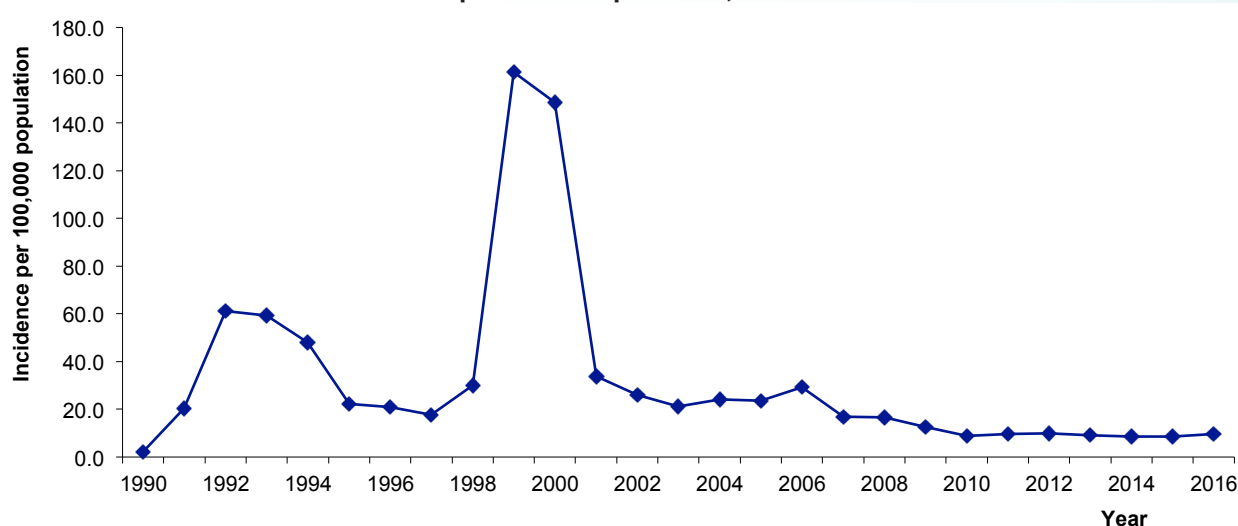
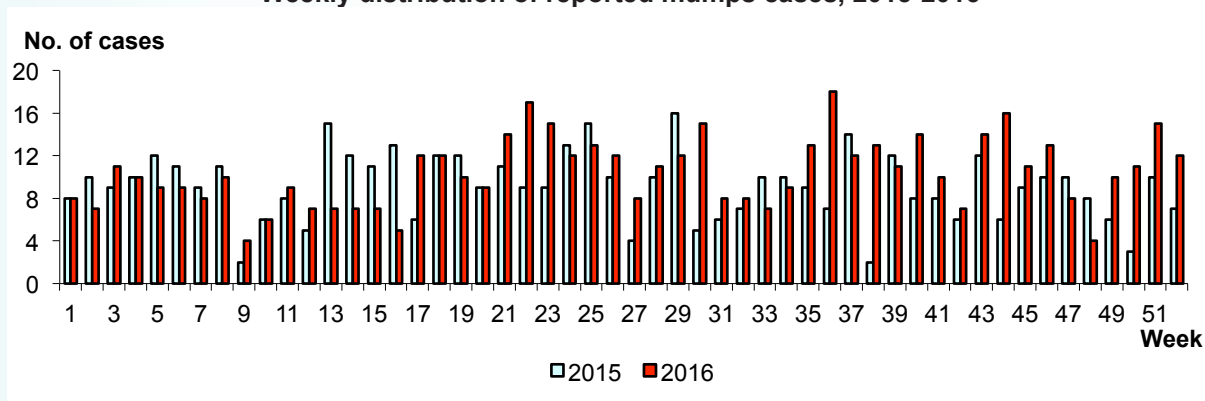


Figure 2.11
Weekly distribution of reported mumps cases, 2015-2016



A total of 540 cases were reported in 2016 as compared to 473 cases in 2015 (Figure 2.11). The incidence rate was highest in the 0-4 years age group (Table 2.16). Among the three major ethnic groups, Malays had the highest incidence rate, followed by Chinese. Foreigners comprised 27.8% of cases (Table 2.17).

Table 2.16
Age-gender distribution and age-specific incidence rate of reported mumps cases, 2016

Age group	Male	Female	Total	%	Incidence rate per 100,000 population*
0-4	47	34	81	15.0	34.8
5-14	80	41	121	22.4	26.0
15-24	36	16	52	9.6	7.0
25-34	57	43	100	18.5	7.9
35-44	37	37	74	13.7	7.4
45-54	40	29	69	12.8	9.1
55+	17	26	43	8.0	3.8
Total	314	226	540	100	9.6

*Rates are based on 2016 estimated mid-year population.
(Source: Singapore Department of Statistics)

Table 2.17
Ethnic-gender distribution and ethnic-specific incidence rate of reported mumps cases, 2016

	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	162	111	273	50.6	9.3
Malay	39	27	66	12.2	12.6
Indian	7	6	13	2.4	3.6
Others	19	19	38	7.0	29.8
Foreigners	87	63	150	27.8	9.0
Total	314	226	540	100	9.6

*Rates are based on 2016 estimated mid-year population.
(Source: Singapore Department of Statistics)

PERTUSSIS

Pertussis is an acute bacterial infection of the respiratory tract caused by *Bordetella pertussis*. Its classical presentation comprises paroxysms of cough and a whooping sound on inspiration. In infants, the infection may be severe with respiratory distress, apnoea and seizures. The mode of transmission is via respiratory droplets or direct contact with the nasal or throat secretions of an infected person.

A total of 85 laboratory confirmed cases of pertussis were reported in 2016 compared to 57 in 2015 (Figure 2.12). Of the 85 reported cases, five were imported cases and the remaining 80 were indigenous cases (Table 2.18). Among the three major ethnic groups, Indians had the highest incidence rate, followed by Chinese (Tables 2.19 and 2.20).

Figure 2.12
Weekly distribution of reported pertussis cases, 2015-2016

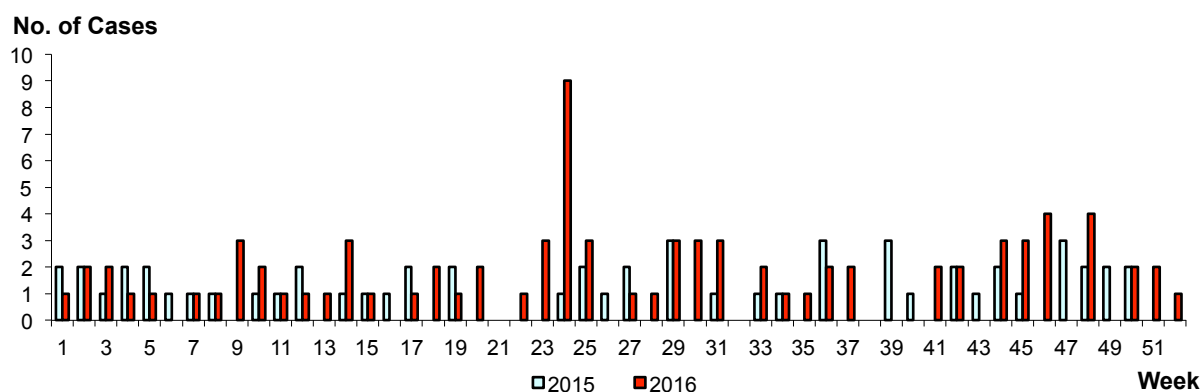


Table 2.18
Total number of notifications* received for pertussis, 2012-2016

Age group	2012		2013		2014		2015		2016	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	9	4	14	1	9	2	47	1	44	2
5-14	0	0	0	0	1	0	0	0	7	0
15-24	11	0	0	1	9	0	7	0	21	0
25-34	0	0	1	0	0	0	0	0	1	0
35-44	0	0	0	0	0	0	0	0	0	1
45-54	0	0	0	0	0	0	1	0	2	1
55-64	0	0	0	0	0	0	1	0	2	0
65+	0	0	0	0	0	0	0	0	3	1
Total	20	4	15	2	19	2	56	1	80	5

*Excluded tourists and foreigners seeking medical treatment in Singapore.

Table 2.19
Age-gender distribution and age-specific incidence rate of reported pertussis cases[^], 2016

Age group	Male	Female	Total	%	Incidence rate per 100,000 population*
0-<1yr	20	23	43	52.4	103.5
1-4	1	1	2	2.4	1.0
5-9	3	4	7	8.5	3.0
10-14	0	0	0	0	0
15-24	21	0	21	25.6	2.8
25-34	0	1	1	1.2	0.1
35-44	1	0	1	1.2	0.1
45-54	1	1	2	2.4	0.3
55-64	2	0	2	2.4	0.3
65+	3	0	3	3.7	0.6
Total	52	30	82	100	1.5

[^]Excluded three foreigners seeking medical treatment in Singapore.

*Rates are based on 2016 estimated mid-year population.

(Source: Singapore Department of Statistics)

Table 2.20
Ethnic-gender distribution and ethnic-specific incidence rate of reported pertussis cases[^], 2016

	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	29	10	39	47.6	1.3
Malay	1	1	2	2.4	0.4
Indian	17	15	32	39.0	9.0
Others	3	1	4	4.9	3.1
Foreigners	2	3	5	6.1	0.3
Total	52	30	82	100	1.5

[^]Excluded three foreigners seeking medical treatment in Singapore.

*Rates are based on 2016 estimated mid-year population.

(Source: Singapore Department of Statistics)

PNEUMOCOCCAL DISEASE

Invasive pneumococcal disease is an acute life-threatening infection of the brain or blood stream caused by the bacteria *Streptococcus pneumoniae*. The mode of transmission is by droplets or close contact with the nasopharyngeal secretions of an infected person.

A total of 131 laboratory-confirmed cases of invasive pneumococcal infection were reported in 2016, a decrease of 10.3% compared to 146 cases reported in 2015 (Figure 2.13). Of the 131 reported cases, 125 were indigenous cases and six were imported cases (Table 2.21). The incidence rate was highest in those aged 65 years and above (Table 2.22). Among the three major ethnic groups, Malays had the highest incidence rate, followed by Chinese and Indians (Tables 2.23). Of these 131 laboratory confirmed IPD cases, 86 cases was serotyped, which corresponded to 65.6% of laboratory confirmed IPD cases. The predominant pneumococcal types were Type 3 in children cases and, Type 3 and Type 6B in adult cases. (Tables 2.24 and 2.25).

Figure 2.13
Weekly distribution of reported invasive pneumococcal disease cases, 2015-2016

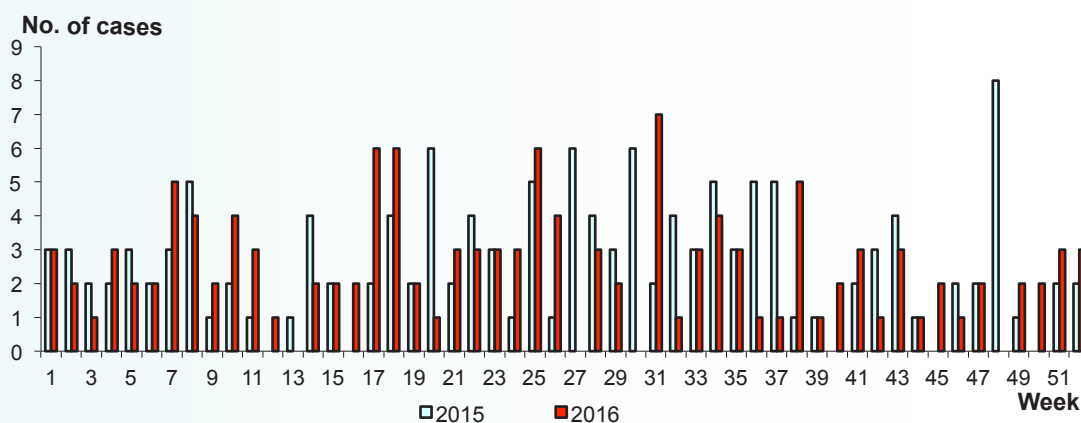


Table 2.21
Total number of notifications* received for invasive pneumococcal disease cases, 2012-2016

Age group	2012		2013		2014		2015		2016	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
0-4	16	1	9	1	14	0	10	1	7	2
5-14	9	0	8	1	7	1	9	0	10	0
15-24	10	0	1	1	2	1	4	0	2	0
25-34	19	0	13	3	11	0	9	1	10	1
35-44	8	0	11	0	9	1	11	0	13	1
45-54	16	0	17	1	11	1	15	0	12	1
55-64	31	0	36	0	24	3	25	0	30	0
65+	52	1	64	1	62	0	60	1	41	1
Total	161	2	159	8	140	7	143	3	125	6

*Excluded tourists and foreigners seeking medical treatment in Singapore.

Table 2.22
Age-gender distribution and age-specific incidence rate of reported invasive pneumococcal disease cases, 2016

Age group	Male	Female	Total	%	Incidence rate per 100,000 population*
0-4	4	5	9	6.9	3.9
5-14	4	6	10	7.6	2.2
15-24	1	1	2	1.5	0.3
25-34	9	2	11	8.4	0.9
35-44	7	7	14	10.7	1.4
45-54	10	3	13	9.9	1.7
55-64	23	7	30	22.9	5.0
65+	27	15	42	32.1	7.8
Total	85	46	131	100	2.3

*Rates are based on 2016 estimated mid-year population.
 (Source: Singapore Department of Statistics)

Table 2.23
Ethnic-gender distribution and ethnic-specific incidence rate of reported invasive pneumococcal disease cases, 2016

	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	49	27	76	58.0	2.6
Malay	18	6	24	18.3	4.6
Indian	3	5	8	6.1	2.2
Others	3	3	6	4.6	4.7
Foreigners	12	5	17	13.0	1.0
Total	85	46	131	100	2.3

*Rates are based on 2016 estimated mid-year population.
 (Source: Singapore Department of Statistics)

Table 2.24
Distribution of pneumococcal serotypes among children cases, 2016

Pneumococcal Type/ Group	Number of isolates
	(n = 16) (%)
Type 3 §	4 (25.0)
Group 11	1 (6.3)
Type 14 *§	2 (12.5)
Group 15	2 (12.5)
Type 19A §	2 (12.5)
Type 19F *§	1 (6.3)
Type 6B *§	1 (6.3)
Type 6C	1 (6.3)
Type 22A	1 (6.3)
Type 23A	1 (6.3)

* Serotype included in PCV7.

§ Serotype included in PCV13.

Table 2.25
Distribution of pneumococcal serotypes among adult cases, 2016

Pneumococcal Type/ Group	Number of isolates
	(n = 70) (%)
Type 3 §	7 (10.0)
Type 4 *§	2 (2.9)
Type 6A §	3 (4.3)
Type 6B *§	7 (10.0)
Type 6C	3 (4.3)
Type 7F §	3 (4.3)
Type 8	3 (4.3)
Type 9V *§	3 (4.3)
Group 10	1 (1.4)
Group 11	2 (2.9)
Group 12	1 (1.4)
Type 14 *§	5 (7.1)
Type 15A	1 (1.4)
Type 15F	1 (1.4)
Type 18C *§	2 (2.9)
Type 18F	1 (1.4)
Type 19A §	6 (8.6)
Type 19F *§	2 (2.9)
Type 20	3 (4.3)
Type 22F	2 (2.9)
Type 23A	4 (5.7)
Type 23F *§	5 (7.1)
Group 33	1 (1.4)
Non-groupable	2 (2.9)

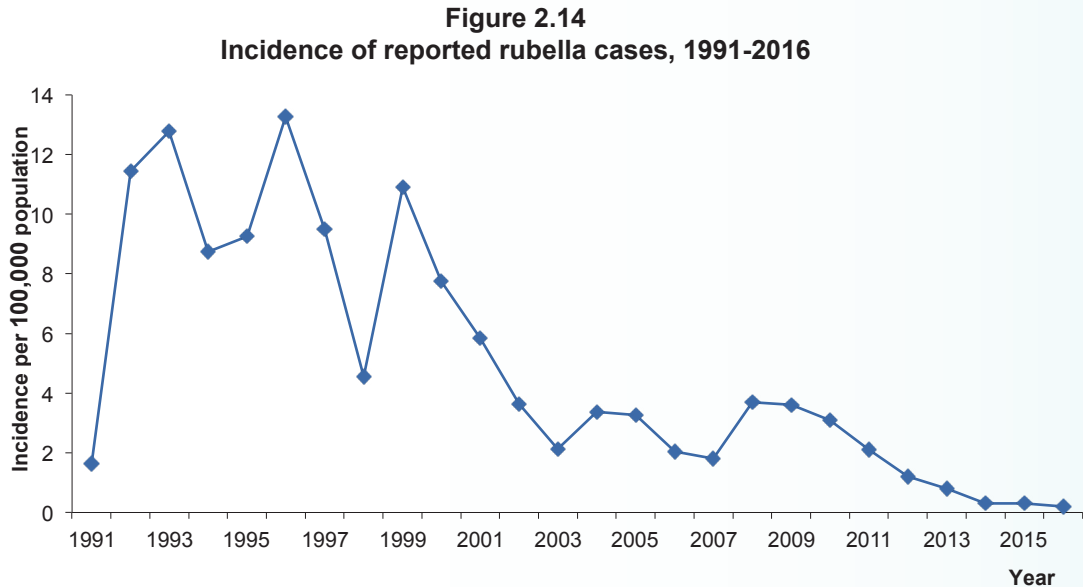
* Serotype included in PCV7

§ Serotype included in PCV13

RUBELLA

Rubella infections may result in a mild febrile illness with a diffuse punctate and maculopapular rash sometimes resembling that of measles or scarlet fever. It is also commonly known as German measles. Rubella is a teratogen, and infection in pregnant women can result in fetal deaths and congenital abnormalities. The causative agent is the rubella virus (genus *Rubivirus*) from the *Togaviridae* family and it is spread through droplets or by close contact with the nasopharyngeal secretions of an infected person.

Rubella incidence fluctuated during 1991-1999. This was followed by a steady decline from 1999 to 2016 (Figure 2.14).



A total of 12 cases of rubella were reported in 2016, compared to 15 cases reported in 2015 (Figure 2.15). Of the 12 reported cases, eight were indigenous cases, two were imported cases and two were foreigners seeking medical treatment in Singapore. The incidence rate was highest in the 0-4 age group (Table 2.27). Four out of eight female cases were in the reproductive age group of 15-44. Among the three major ethnic groups, Malays had the highest incidence rate, followed by Chinese (Table 2.28). There were no cases of congenital rubella.

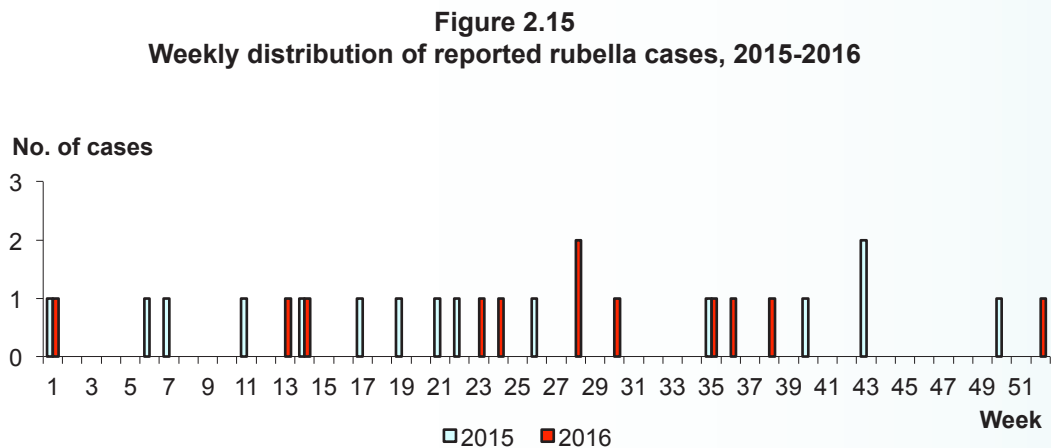


Table 2.26
Total number of notifications* received for rubella cases, 2012-2016

Age group	2012		2013		2014		2015		2016	
	Local	Imported	Local	Imported	Local	Imported	Local	Imported	Local	Imported
< 6 mths	3	0	2	0	0	0	1	0	2	0
6 mths-< 1 yr										
1-4	9	0	3	0	5	0	3	0	3	0
5-9	3	0	0	0	1	0	1	0	0	0
10-14	1	0	0	0	1	0	0	0	0	0
15-24	10	0	2	0	0	0	1	0	1	0
25-34	21	1	10	1	3	1	4	0	2	1
35-44	4	0	12	2	2	2	3	0	0	1
45-54	5	0	7	0	0	0	0	0	0	0
55+	1	0	5	0	0	0	0	0	0	0
Total	57	1	41	3	12	3	13	0	8	2

*Excluded tourists and foreigners seeking medical treatment in Singapore.

Table 2.27
Age-gender distribution and age-specific incidence rate of reported rubella cases[^], 2016

Age group	Male	Female	Total	%	Incidence rate per 100,000 population*
0-4	1	4	5	50.0	2.1
5-14	0	0	0	0	0
15-24	0	1	1	10.0	0.1
25-34	0	3	3	30.0	0.2
35-44	1	0	1	10.0	0.1
45-54	0	0	0	0	0
55+	0	0	0	0	0
Total	2	8	10	100	0.2

[^]Excluded two foreigners seeking medical treatment in Singapore.

*Rates are based on 2016 estimated mid-year population.

(Source: Singapore Department of Statistics)

Table 2.28
Ethnic-gender distribution and ethnic-specific incidence rate of reported rubella cases[^], 2016

	Male	Female	Total	%	Incidence rate per 100,000 population*
Singapore residents					
Chinese	1	1	2	20.0	0.1
Malay	0	1	1	10.0	0.2
Indian	0	0	0	0	0
Others	0	0	0	0	0
Foreigners	1	6	7	70.0	0.4
Total	2	8	10	100	0.2

[^]Excluded two foreigners seeking medical treatment in Singapore.

*Rates are based on 2016 estimated mid-year population.

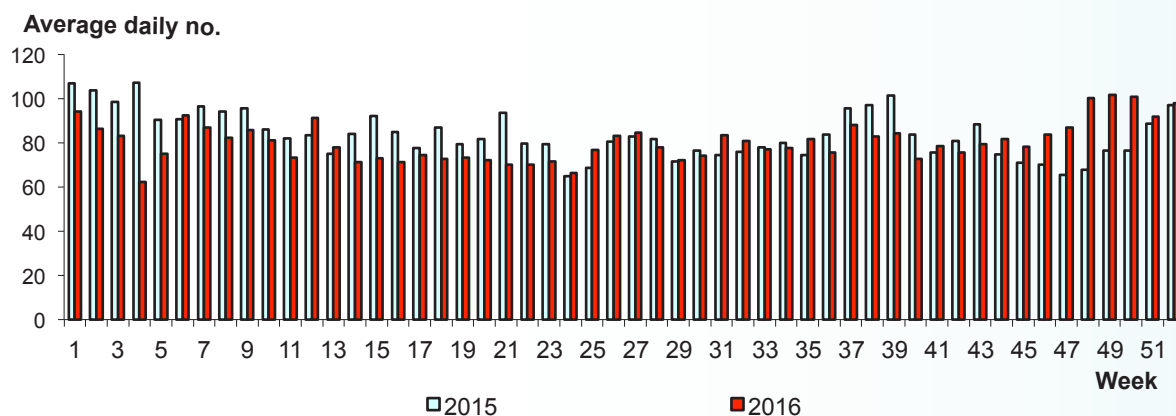
(Source: Singapore Department of Statistics)

VIRAL CONJUNCTIVITIS

Viral conjunctivitis is a clinical syndrome characterised by lacrimation, irritation and hyperaemia of the palpebral and bulbar conjunctivae. The common causative agents are the adenoviruses and the enteroviruses.

In 2016, the polyclinics reported 22,242 attendances for conjunctivitis, a decrease of 2.0% compared to 22,693 attendances reported in 2015 (Figure 2.16).

Figure 2.16
Weekly distribution of reported conjunctivitis cases, 2015-2016



CHICKENPOX

There were a total of 3,998 attendances in polyclinics for chickenpox in 2016 compared with 3,837 attendances in 2015. 91.0% of the attendances were by Singaporeans and Permanent Residents. Persons below the age of 20 years represented 62.6% of attendances for chickenpox (Table 2.29).

Table 2.29
Distribution of varicella (chickenpox) polyclinic attendances by age group and nationality, 2016

Age group	Singaporeans/PRs			Foreigners			Total	%
	Male	Female	Total	Male	Female	Total		
0-9	899	764	1,663	20	7	27	1,690	42.2
10-19	419	393	812	3	0	3	815	20.4
20-29	164	156	320	148	15	163	483	12.1
30-39	130	116	246	85	31	116	362	9.1
40-49	102	59	161	38	4	42	203	5.1
50-59	100	55	155	1	1	2	157	3.9
60+	156	126	282	3	3	6	288	7.2
Total	1,970	1,669	3,639	298	61	359	3,998	100

NOTE ON TUBERCULOSIS: Singapore has a well established Singapore TB Elimination Programme (STEP) registry and its details on local disease epidemiology are reported separately in Chapter 6.

Contributed by
Cherie See, Constance Low,
Imran Muhammad,
Kelly Foo, Lin Yijun,
Nigel Chong, Steven Ooi

