

UNIT NO. 1

COMMUNICABLE DISEASES OF COMMUNITY IMPORTANCE – AN EPIDEMIOLOGICAL OVERVIEW

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ABSTRACT

Communicable diseases continue to pose a threat to the health of Singaporeans. Despite advances in medical science and the implementation of good public health infrastructure and hygiene measures, new and old diseases continue to emerge and re-emerge. Family physicians are often the first point of contact for patients infected with communicable diseases. Understanding the epidemiology of communicable diseases in the community would enable the family physician to better manage, prevent and control these diseases.

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INTRODUCTION

Communicable diseases continue to pose a threat to the health of Singaporeans. Despite advances in medical science and the implementation of good public health infrastructure and hygiene measures, new and old diseases will continue to emerge and re-emerge. In Singapore, communicable diseases of community importance include dengue fever, chikungunya fever, malaria, chickenpox, measles, mumps, rubella, hand-foot-and-mouth disease, influenza, tuberculosis, salmonellosis, typhoid fever, norovirus gastroenteritis, HIV/AIDS and other sexually-transmitted infections (STI). HIV/AIDS and STI will not be covered here, as they have already been extensively covered in the Skills Course on “STI and HIV/AIDS” (SFP2007; 33(2)).

VECTOR-BORNE DISEASES

- κ Dengue fever
- κ Chikungunya fever
- κ Malaria

Dengue Fever

Dengue fever is the most common vector-borne disease in Singapore. It is most commonly transmitted by the *Aedes aegypti* mosquito.

Although year-round transmission is observed, dengue fever incidence increases during the hotter months of the year, usually July-September. All four dengue serotypes are present in Singapore. However, DEN 1 & 2 are the more common

circulating serotypes. Whenever a change in the circulating dengue serotype occurs, dengue incidence surges and outbreaks occur around the island. In 2006, dengue infection was more common in males (male to female ratio 1.5 : 1) and its incidence was highest in the age group 55 years and above. DEN 1 was the predominant circulating serotype. In 2007, a total of 8,826 cases of dengue fever/dengue haemorrhagic fever and 20 deaths were reported. Dengue incidence was almost triple that of 2006 (3,127 cases), as there was a change in the circulating dengue serotype to predominantly DEN 2 in 2007.

Chikungunya Fever

Chikungunya fever is transmitted by the same vector as dengue fever. Contrary to dengue fever, which is endemic in Singapore, Chikungunya fever has only emerged recently. In November 2006, a case of Chikungunya infection acquired in Singapore was reported in a Taiwanese student who was diagnosed after returning to Taiwan. In 2007, ten cases of chikungunya fever were reported. All were imported.

In January 2008, a local outbreak of chikungunya fever occurred in Little India area. The primary case was a 27-year-old foreigner who had not travelled out of Singapore for several months. He had presented to his general practitioner (GP) with dengue-like symptoms and was diagnosed with chikungunya fever on 14 January 2008, through a laboratory-based GP surveillance network. In total, 13 cases of chikungunya fever, confirmed on PCR, were epidemiologically linked to the outbreak. Fever (100%) and arthralgia (85%) were the most common presenting symptoms. The last case had an onset of illness on 28 January 2008 and the outbreak was declared over on 21 February 2008. Phylogenetic analysis of the viral sequences has revealed that the circulating strains were related to those from India's 2006 outbreak.

Malaria

Singapore was declared free of indigenous transmission of malaria by the World Health Organization (WHO) in 1982. However, Singapore remains at risk of malaria transmission. This is due to the endemicity of malaria in neighbouring countries and the presence of *Anopheles* mosquitoes in local coastal areas and hilly terrains.

Although the majority (>90%) of malaria cases in Singapore were imported, occasional local outbreaks have also been observed. Between 24 March and 11 September 2006, a cluster of 13 cases of vivax malaria among male Indian nationals aged 20-47 years were reported on Jurong Island and Pulau Busing. They had come from different parts of

Figure 1: Dengue Fever/Dengue Haemorrhagic Fever Incidence, by Year 1995-2006

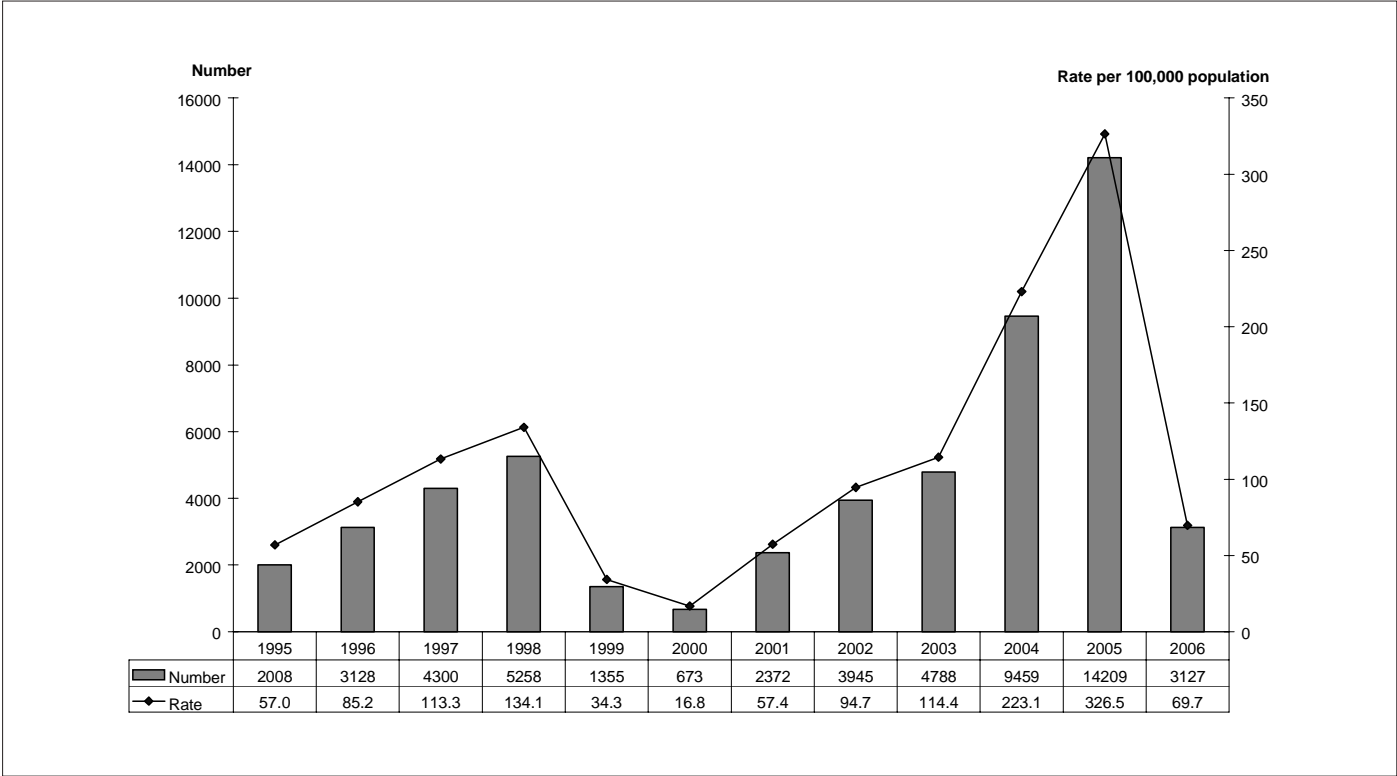
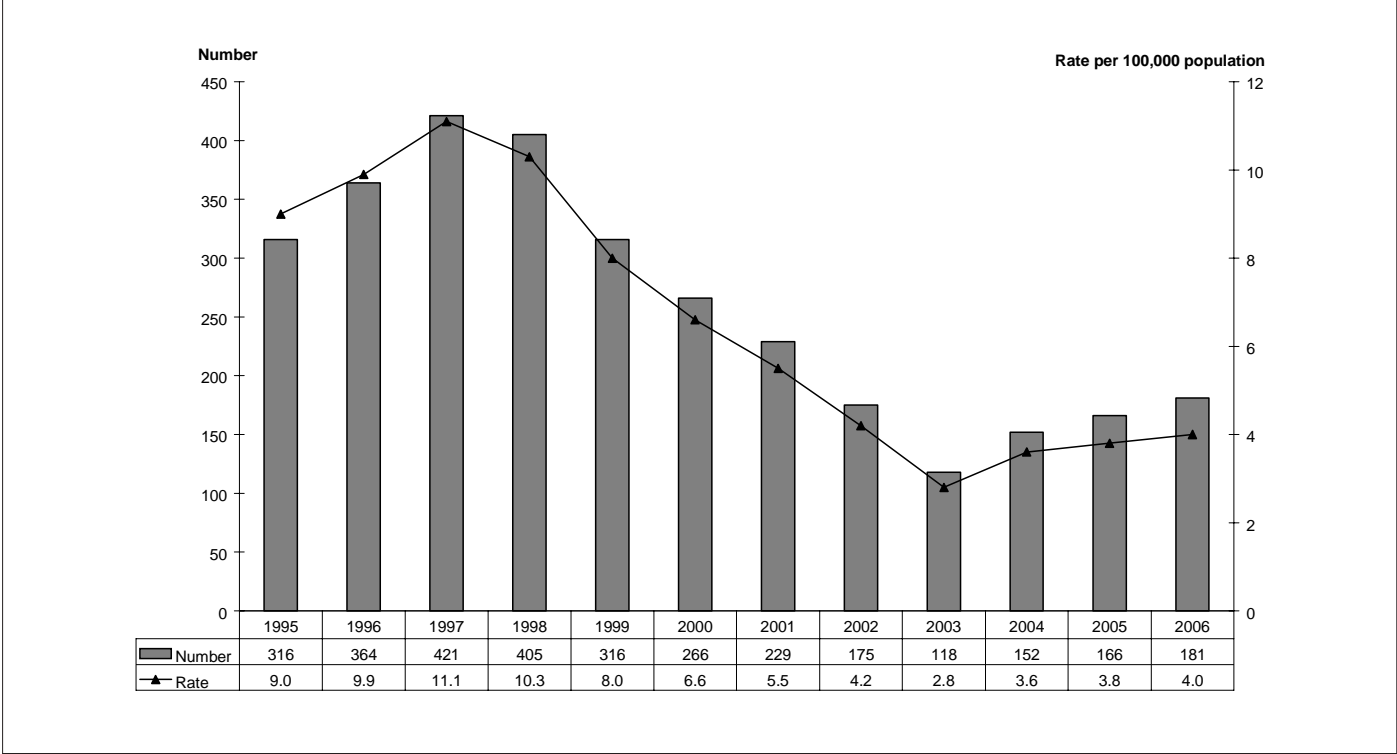


Figure 2: Malaria Incidence, by Year 1995-2006



India and had developed febrile illness 1 to 11 months post-arrival in Singapore. Epidemiological investigations suggested that these foreign workers had most probably acquired malaria from the islands.

Among residents, malaria incidence was highest among

young adults aged 25-34 years and more common in males (male to female ratio 3.3 : 1). Most patients who had acquired malaria overseas have been infected in Indonesia (38.6%) and India (37.3%). *Plasmodium vivax* accounted for the majority of these infections.

AIR-/DROPLET-BORNE DISEASES

- ✧ Chickenpox
- ✧ Measles, Mumps, Rubella (MMR)
- ✧ Hand, Foot and Mouth Disease (HFMD)
- ✧ Influenza
- ✧ Tuberculosis

Chickenpox

Chickenpox is a highly contagious viral disease and tops the list of reported infectious diseases in Singapore. In the past 12 years, an annual average of 26,000 cases has been reported. Although varicella vaccines have been licensed since 1996, varicella immunisation has not been incorporated into the national childhood immunisation programme.

The incidence of chickenpox declined with age; the highest age-specific incidence has been in children under the age of five. Although mostly a mild disease, chickenpox has contributed to an average of 817 hospitalisations annually. In 2006, no death from chickenpox was reported.

Measles, Mumps, Rubella

Measles vaccination has been introduced into the national childhood immunisation programme since 1976. It was legally mandated for children aged 12-24 months from 1985. The trivalent Measles, Mumps and Rubella (MMR) vaccine was subsequently incorporated in 1990, followed by the introduction of the two-dose regime since 1998. As a result, laboratory-confirmed measles incidence has declined significantly from 37.2 per 100,000 population in 1997 to

0.6 per 100,000 in 2006. However, high vaccination coverage ($\geq 95\%$) for the two-dose strategy would have to be consistently ensured, in order for measles to be eliminated in Singapore (the World Health Organization Western Pacific Region has identified 2012 as the target year for measles elimination in the region). Sporadic small institutional outbreaks can occur among children who had not completed the two-dose vaccination regime. In 2004, an outbreak involving nine students in a primary school was reported. Although two of them had been vaccinated with the first dose of MMR, none had received the second MMR dose.

✧ With effective MMR vaccination, mumps and rubella incidence have also declined over the years. The incidence of mumps decreased from 161.6 per 100,000 population in 1999 to 18.8 per 100,000 in 2006. Rubella incidence has also declined significantly from 13.3 per 100,000 in 1996 to 2.0 per 100,000 in 2006. However, the national seroprevalence study conducted in 2005 revealed that 12% of women in the childbearing age did not have immunity against rubella. In 2005, a child was born with congenital rubella syndrome. The mother had no documented MMR or rubella vaccination, and had acquired rubella infection at the seventh gestational week. In 2006, although no congenital rubella was reported, there were three terminations of pregnancy as a result of maternal rubella infection. To prevent such infections, previously unvaccinated women should be offered rubella immunisation at least three months prior to conception.

Figure 3: Chickenpox Incidence, by Year 1995-2006

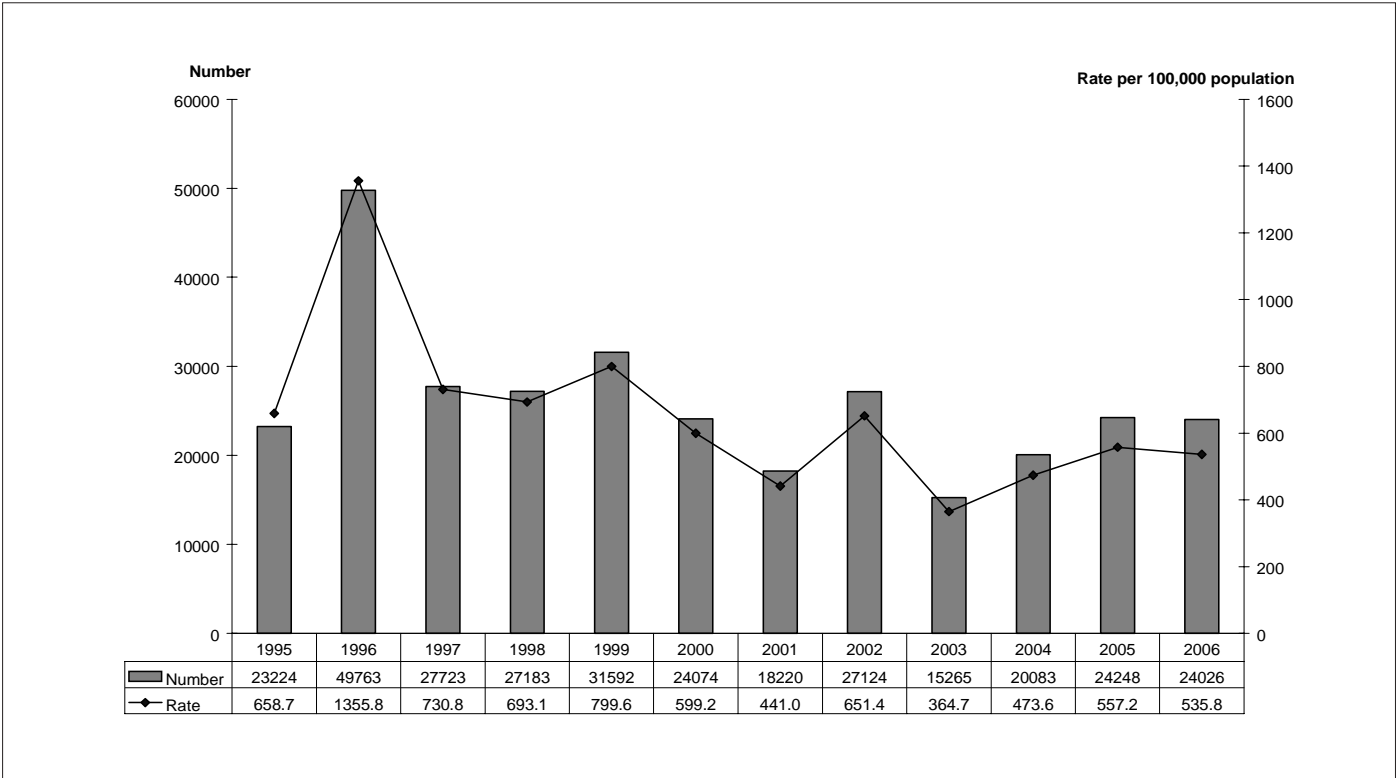
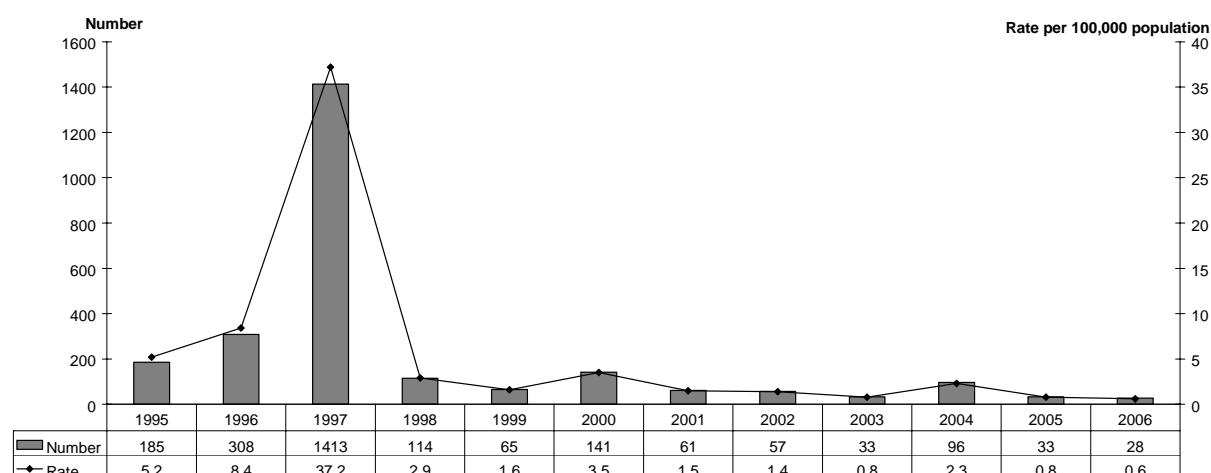


Figure 4: Measles Incidence, by Year 1995-2006

HAND, FOOT AND MOUTH DISEASE (HFMD)

With effect from 1 Oct 2000, HFMD has been made a notifiable infectious disease under the Infectious Diseases Act. HFMD cases have been reported throughout the year, with seasonal peaks observed in March and October annually. HFMD incidence was highest in the under-5 age group, which accounted for almost two-thirds of all reported HFMD cases in 2006. A total of 15,282 HFMD cases and 1,363 outbreaks were reported in 2006. Most outbreaks had occurred in childcare centres, with coxsackievirus type A6 being the predominant enterovirus isolated. Attack rates ranged from <10% to 50%. During the last HFMD epidemic in September–November 2000, enterovirus 71 (EV71) was the causative organism. Four children died during that epidemic. In the following year, although a non-epidemic year, another three EV71-related deaths were observed. Since then, there has not been any death from HFMD reported in Singapore.

Influenza

It has been well established that influenza causes significant morbidity and mortality during winter in temperate countries. Although the impact of influenza was thought to be less in tropical countries, it has been demonstrated that influenza had caused an average of 588 deaths in Singapore annually. Influenza-associated deaths were 11.3 times higher in the elderly aged 65 years and above. Influenza continues to cause an increasing amount of disease among Singaporeans, particularly in our rapidly aging population.

In tropical Singapore, influenza viruses circulate year-round, with a bimodal increase in influenza incidence observed in April–July and November–January. The peaks correspond approximately to increased influenza activities in temperate countries in the Southern and Northern hemispheres, respectively. In 2006, moderate activity was observed in January (influenza A activity was 5.7% during epidemiological-week 1). This was followed by a period of low activity until late May. A rapid surge in influenza A activity was observed in June, peaking in the last week of June (epidemiological-week 26) with one in five clinical specimens (20.8%) testing positive for influenza A, before subsiding in late July.

Tuberculosis (TB)

Despite Singapore's socio-economic development, TB has remained endemic in Singapore. After a rapid decline in incidence from 1960s to 1980s, TB incidence has decreased more slowly from 54.8 per 100,000 residents (1,712 cases) in 1997 to 35.6 per 100,000 (1,256 cases) in 2006 and 35.1 per 100,000 (1,256 cases) in 2007. Males accounted for 68% (851 cases) of new TB cases in 2007, and more than half (56%) of the patients were aged 50 years and above. Fortunately, Multi Drug Resistant Tuberculosis (MDRTB) has remained low among Singapore residents, at 0.3% in new cases and 1.4% among relapsed cases. However, MDRTB rates were much higher among non-residents, at 1.7% in new TB cases and almost 20% in previously treated/relapsed cases.

FOOD-BORNE DISEASES

- κ Salmonellosis
- κ Typhoid fever
- κ Norovirus gastroenteritis

Salmonellosis

Salmonella infections are the most common cause of food-borne diseases notified in Singapore. *Salmonella enteritidis* contributed to more than half (56.6%) of the 380 non-typhoidal salmonellosis reported in 2006. Age-specific incidence was highest among those aged 55 years and above. A third of these patients had co-morbid conditions.

During November-December 2007, an outbreak of Salmonellosis linked to Prima Deli factory resulted in 33 incidents involving 204 cases associated with the consumption of food items produced by the factory. Fifteen people were hospitalised, but all recovered uneventfully. Six factory food handlers and multiple food and environmental samples were found to be positive for *Salmonella enteritidis*.

Typhoid fever

Typhoid fever cases in Singapore have largely been imported. In 2006, 41 residents were diagnosed with typhoid fever. All except five sporadic cases were imported. One-third had contracted the infection while on vacation. Half of the imported typhoid cases had travelled to India, one-third to Indonesia and the remaining to Bangladesh and Malaysia.

Norovirus gastroenteritis

Norovirus is the leading cause of gastroenteritis outbreaks in community as well as institutional settings. Norovirus can be transmitted via the faecal-oral route, food-borne, water-borne, through direct contact or via fomites. The first norovirus gastroenteritis outbreaks in Singapore were reported between 16 December 2003 and 4 January 2004. They were all associated with the consumption of raw imported half-shelled frozen oysters. A total of 305 people were infected and their clinical symptoms included diarrhoea (94%), abdominal cramps (72%), vomiting (69%) and fever (54%). The duration of illness was short, lasting two to three days. With the Agri-Food and Veterinary Authority (AVA)'s enhanced surveillance and regulations on seafood, no new outbreak of food-borne norovirus gastroenteritis has since been reported.

Outbreaks of norovirus gastroenteritis have been periodically reported in nursing and welfare homes, childcare centres and schools. In such institutional outbreaks, norovirus transmission was likely to be from person-to-person through direct contact or via fomites. In an outbreak involving a destitute welfare home in February 2005, residents and staff were both infected. However, the attack rate among residents was much higher (44.5%) than that among staff (8%). All had mild illness and recovered within 24 hours. In September-October 2006, two large norovirus outbreaks were reported among students and staff of a secondary and a primary school. Investigations revealed that the main modes of transmission were faecal-oral through sick food handlers and via direct

contact with contaminated environment respectively. In July 2007, a large norovirus gastroenteritis outbreak was reported in a primary school. A total of 147 students and staff from the school were infected. The presenting symptoms were vomiting (93%), abdominal pain (72%), fever (69%), diarrhoea (55%), headache (29%), and nausea (14%). All recovered with either self-medication or outpatient treatment. Norovirus was identified in the stools of six food handlers from the school. One of them had continued preparing drinks in the school, whilst ill with vomiting and diarrhoea. Poor hygiene practices among food handlers were identified. Transmission had probably occurred via the faecal-oral route, and through environmental contact.

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LEARNING POINTS

- ✧ Communicable diseases continue to pose a threat to the health of Singaporeans. Despite advances in medical science and the implementation of good public health infrastructure and hygiene measures, new and old diseases continue to emerge and re-emerge.
 - ✧ Dengue fever remains the most common vector-borne disease in Singapore. Chikungunya fever, which is transmitted by the same vector and has similar clinical features as dengue fever, has recently emerged.
 - ✧ Although declared free of indigenous malaria transmission by the WHO since 1982, Singapore remains at risk of importation and transmission of malaria.
 - ✧ Chickenpox and HFMD occurs most frequently in children under the age of five.
 - ✧ Ensuring consistently high vaccination coverage for the two-dose MMR regime is critical for the prevention of measles outbreaks in schools and the successful elimination of measles in Singapore.
 - ✧ Rubella infections continue to be observed in expectant mothers. Twelve per cent of women in the childbearing age have no immunity against rubella. Previously unvaccinated women should be offered rubella immunisation at least three months prior to conception.
 - ✧ Influenza viruses circulate year-round in Singapore, with a bimodal increase in activity observed in April–July and November–January. Influenza can cause excess deaths in tropical Singapore. Elderly aged 65 years and above are at higher risk.
 - ✧ Salmonella infections are the most common cause of food-borne disease reported, with *Salmonella enteritidis* contributing to more than half of non-typhoidal salmonellosis. Incidence is highest among the elderly, particularly those with co-morbidities.
 - ✧ Norovirus is the leading cause of gastroenteritis outbreaks in community as well as institutional settings. Previous outbreaks have been associated with the consumption of raw oysters, faecal-oral transmission via food handlers, as well as direct contact with contaminated environment.
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