



An Update on Infectious Diseases in Hong Kong

Dr. WONG Ka-hing

Controller, Centre for Health Protection, Department of Health

16th Annual Scientific Meeting

Stanley Ho Centre for Emerging Infectious Diseases, CUHK

11 June 2019



衛生署

Department of Health

Highlights of selected infections of local concern

Endemic infection with seasonality

- Seasonal influenza and vaccine effectiveness at primary care setting

Re-emerging infection

- Dengue fever

Eliminated infection with potential re-establishment of endemicity

- Measles

Infection with upsurge in activity

- Pertussis and vaccination for pregnant women

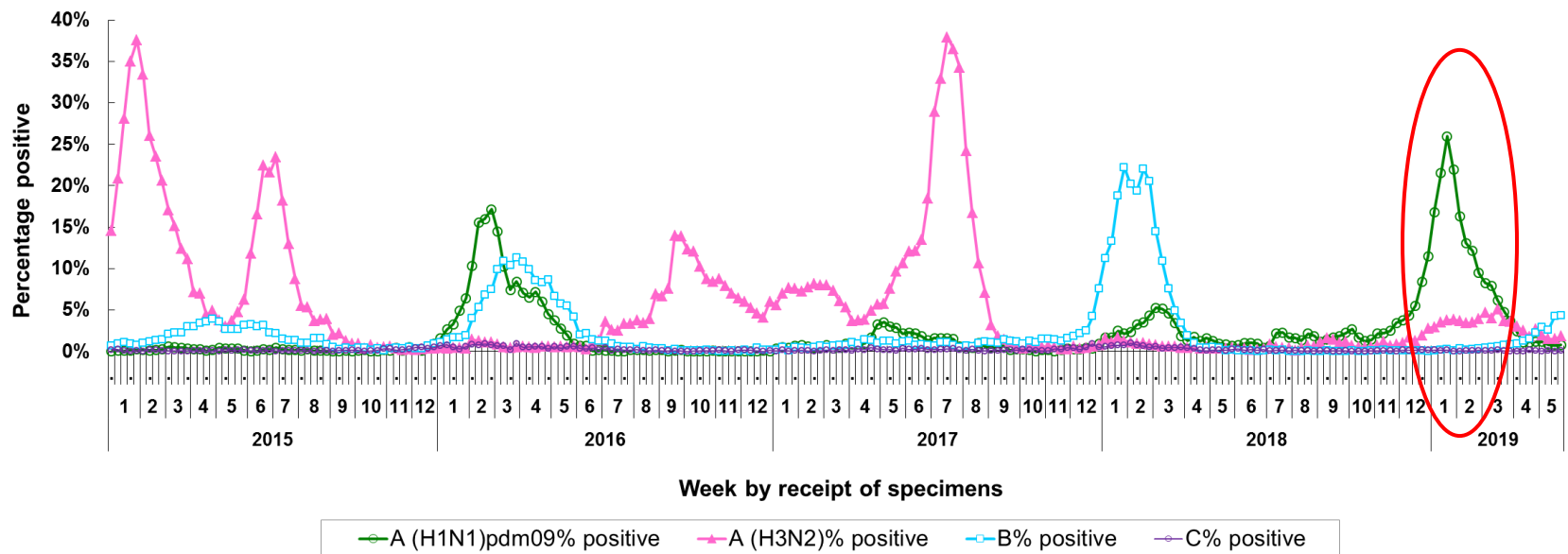
Seasonal Influenza – a major communicable disease burden in Hong Kong

Overview of 2018/19 winter influenza season

- Lasted for 14 weeks (from week 1 to 14, 2019)
- Predominated by influenza A(H1) (75%), followed by influenza A(H3) (22%), influenza B remained low (2%)
- Overall local seasonal influenza activity had increased rapidly to a very high level in mid to late Jan
- Started to decrease since Feb and returned to baseline in early Apr
- Large number of ILI outbreaks, mostly in kindergartens/ child care centres (KGs/CCCs)
- Hospitalisation rates were highest in young children < 6 years
- Severe cases mainly affected elderly

Laboratory surveillance

- Predominating virus in 2018/19 winter season : H1 (75% of all positive detections)
- Positive percentage among respiratory specimens reached the peak of 30.1% in mid-January (within the range of 26.4% to 40.9% from 2015 to 2018)



MEM for assessment of impact & severity

- Moving Epidemic Method (MEM) is an internationally adopted mathematical method for establishing epidemic and intensity thresholds to monitor impact and severity of seasonal influenza epidemics
- As a pilot starting in 2019, MEM was used to set intensity levels (low / medium / high / very high) for 2 surveillance parameters using historical data from 2011-2018:
 - i. Weekly no. of institutional ILI outbreaks (*reflecting transmissibility*); and
 - ii. Influenza-associated admission rate in public hospitals (*reflecting severity*)
- For objective comparison of the current data with those observed in the past

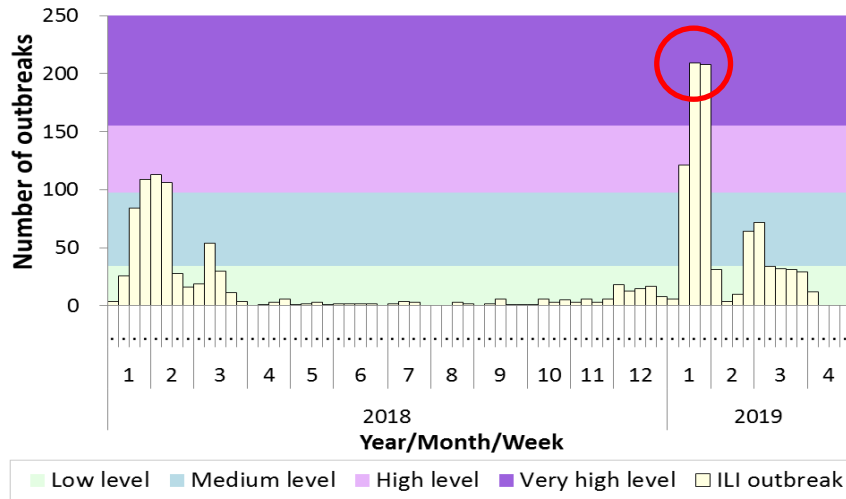
Institutional ILI outbreaks

- A total of 863 ILI outbreaks in schools/institutions were recorded, which was the highest number recorded after the 2009 pandemic

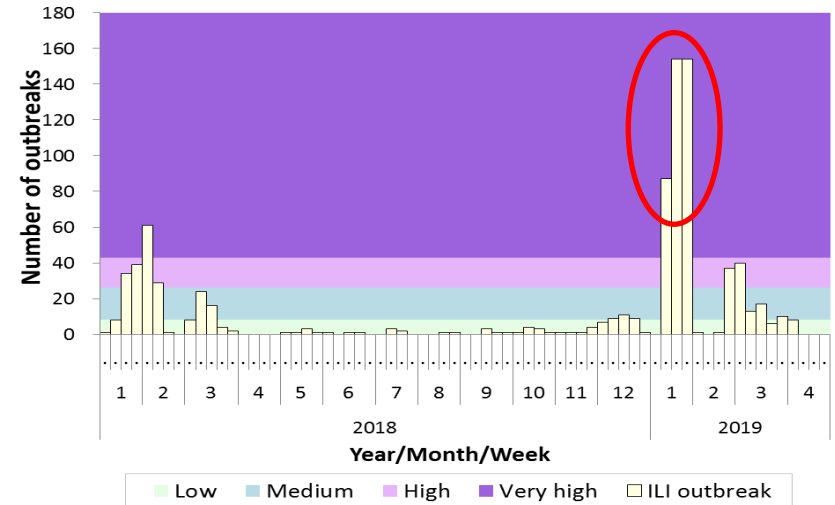
Type	Cumulative no. of outbreaks (%)	
	2018/19 winter	2017/18 winter
KG/CCC	528 (61.2%)	227 (37.8%)
Primary school	183 (21.2%)	210 (35.0%)
Secondary school	35 (4.1%)	46 (7.7%)
Residential care home for the elderly	55 (6.4%)	72 (12.0%)
Residential care home for persons with disabilities	19 (2.2%)	15 (2.5%)
Others	43 (5.0%)	30 (5.0%)

Weekly no. of institutional ILI outbreaks (2018 - 2019)

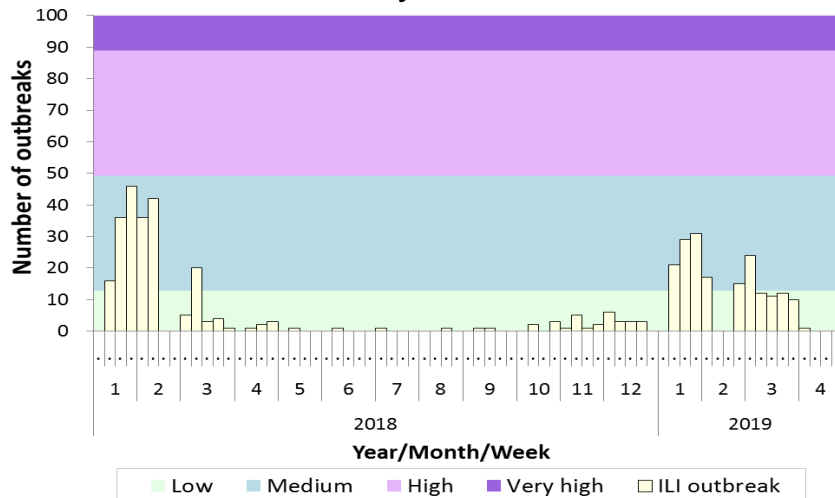
All schools /institutions



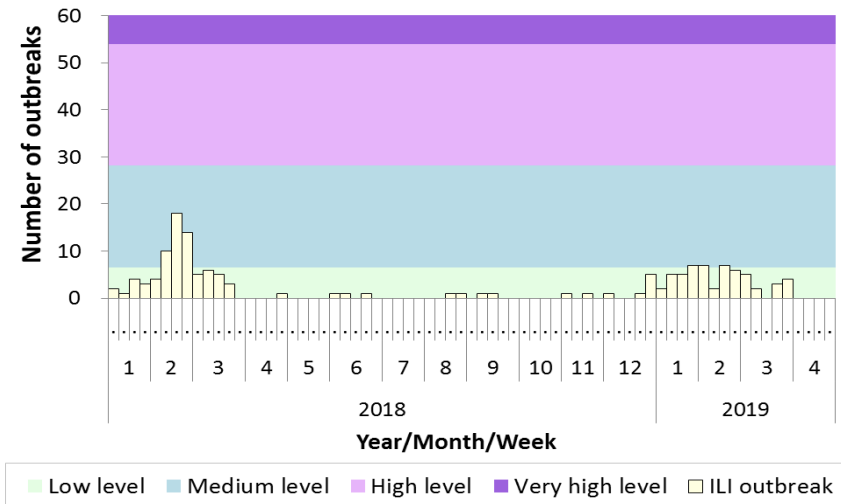
KGs/CCCs



Primary schools



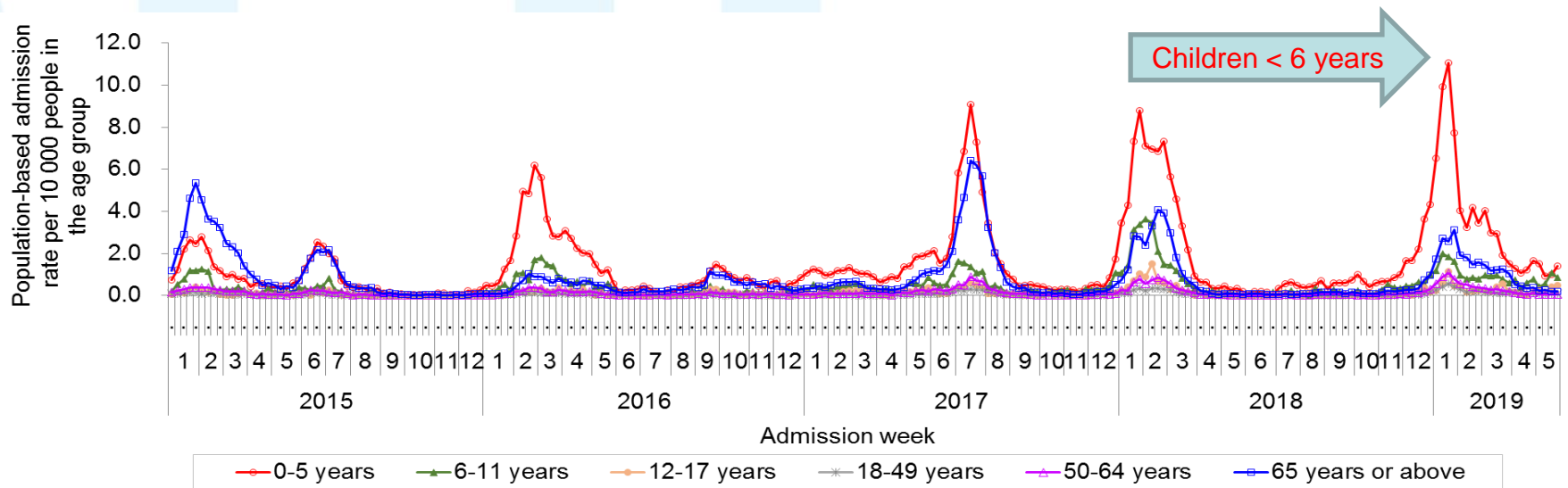
RCHEs



Weekly influenza-associated admission rates in public hospitals

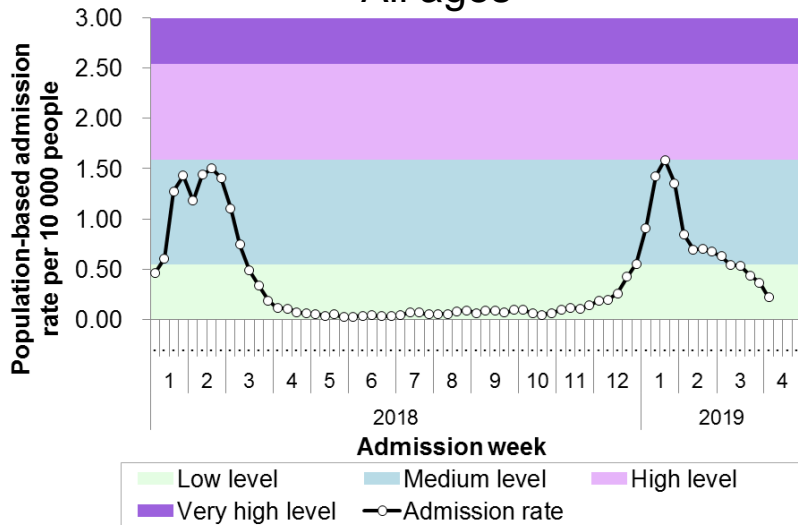
- Highest in young children <6 years, followed by elderly ≥65 years, and then children 6-11 years
- The rate among young children was the highest in the past 5 years

Season (predominating virus)	Peak weekly admission rate (per 10,000 population)						
	0-5	6-11	12-17	18-49	50-64	≥65	All ages
2018/19 winter (H1)	11.07	1.99	1.13	0.56	1.06	3.10	1.59
2017/18 winter (B)	8.81	3.62	1.50	0.36	0.87	4.06	1.50
2017 summer (H3)	9.09	1.65	0.61	0.31	0.87	6.36	1.91
2015/16 winter (H1&B)	6.15	1.79	0.38	0.17	0.38	1.04	0.67
2014/15 winter (H3)	2.78	1.26	0.42	0.16	0.39	5.34	1.17

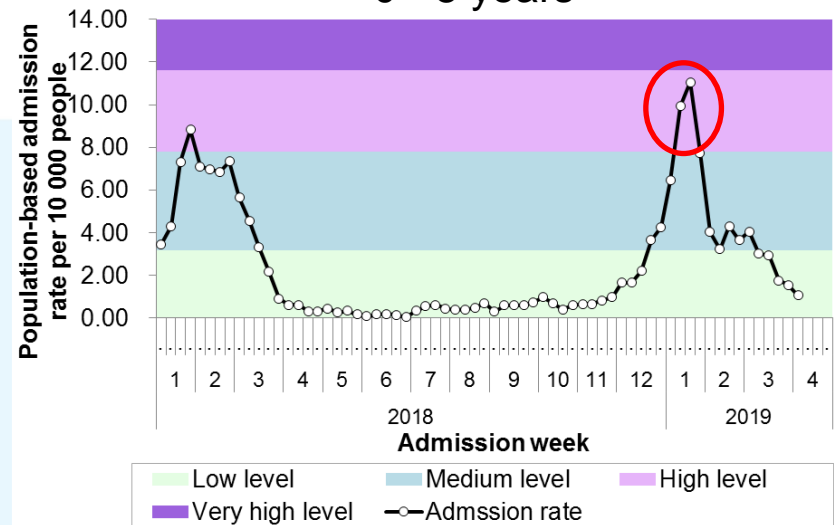


Influenza-associated admission rates in public hospitals (2018 - 2019)

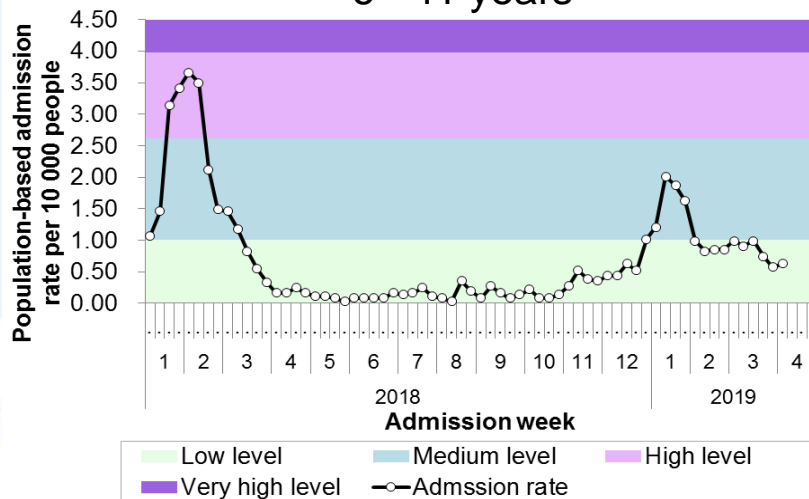
All ages



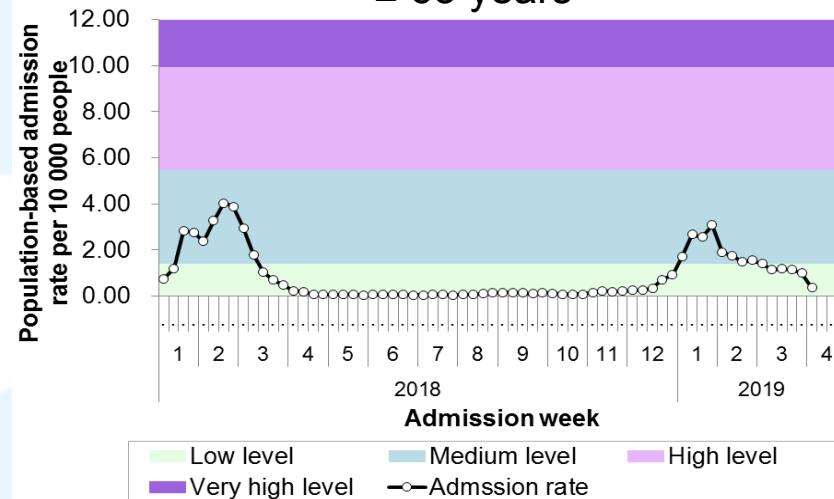
0 - 5 years



6 - 11 years

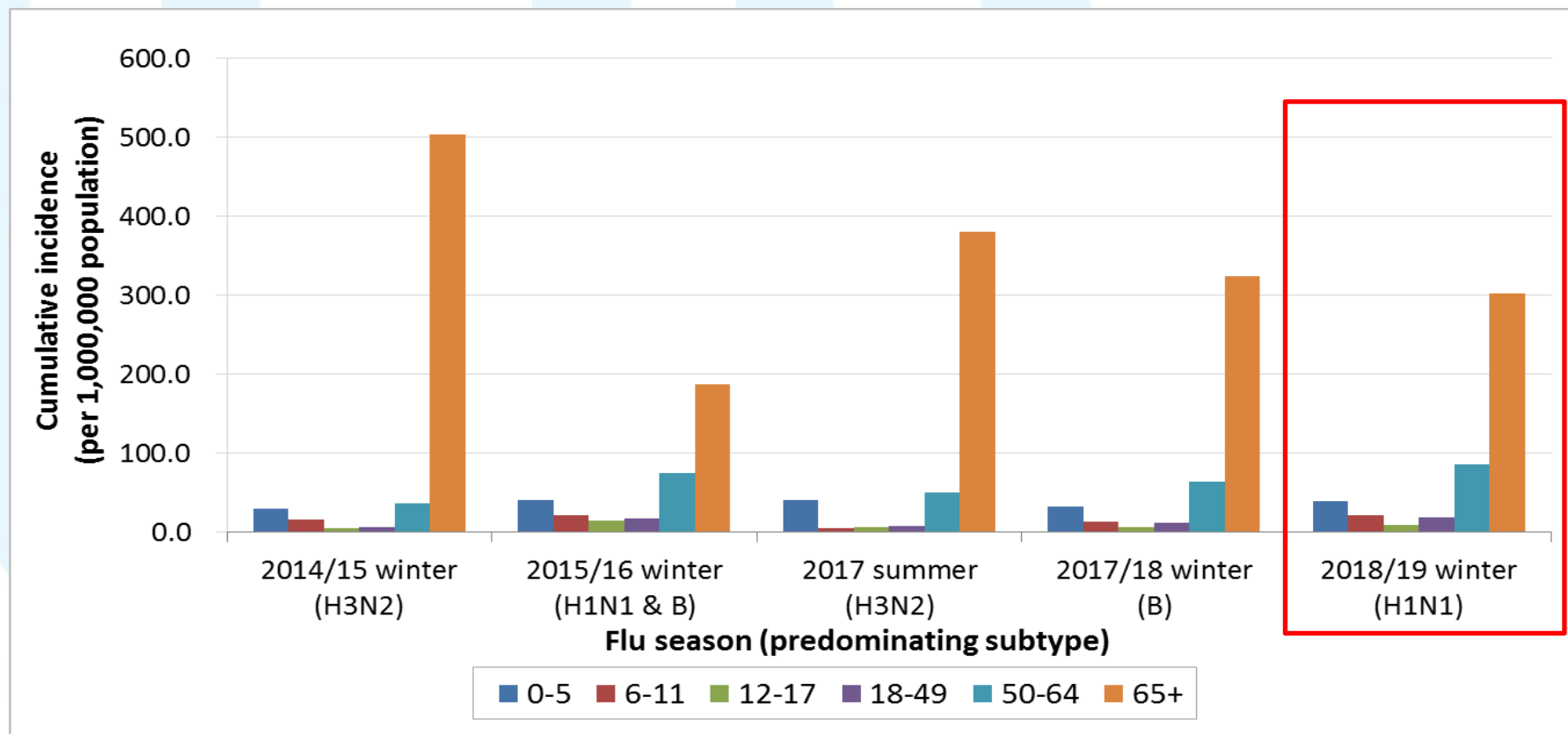


≥ 65 years



Cumulative incidences of severe cases (per million population)

- Much higher in elderly than other age groups
- Second high was 50-64 years, followed by young children 0-5 years



Estimates of Vaccine Effectiveness of SIV at Primary Care Setting in HK

No. of specimens collected (2018/19 winter season)

Respiratory
specimens
collected (n=1,037)

Study period:
Dec 2018 to Mar 2019

- 58 excluded (5.6%)
- Unknown SIV history and/or chronic disease status: 55 (5.3%)
 - < 6 months of age: 2 (0.3%)

Respiratory
specimens analysed
(n=979)

Influenza-positive cases

- Any influenza A/B (n=526)
- Influenza A(H1) (n=368)

Influenza-negative
controls
(n=453)

Estimates of vaccine effectiveness of SIV

All influenza (Influenza A/ B)					
Characteristics	Cases		Controls		VE[^]
	No. vac/ No.	% vac	No. vac/ No.	% vac	% (95%CI)
All ages	87/526	16.5	150/453	33.1	57.9 (42.0 to 72.7)
6 months to 17 years	46/207	22.2	84/229	36.7	53.7 (26.6 to 71.1)
18 to 64 years	23/274	8.4	31/168	18.5	69.1 (41.6 to 84.0)

Influenza A (H1)					
All ages	58/368	15.8	150/453	33.1	60.2 (42.4 to 72.7)
6 months to 17 years	29/139	20.9	84/229	36.7	54.4 (22.2 to 73.8)
18 to 64 years	18/201	9.0	31/168	18.5	68.9 (37.4 to 85.0)

Influenza A (H3)					
All ages	27/141	19.1	150/453	33.1	52.8 (23.5 to 71.7)

[^]Adjusted for age, time of specimen received (week) and chronic medical illness

New initiatives in 2018-19 season to promote vaccination among children

- School Outreach Vaccination Pilot Programme
 - DH Outreach Teams
 - Public-Private-Partnership Outreach Teams
- Enhanced Vaccination Subsidy Scheme (VSS) Outreach Vaccination
 - Increased subsidy for each dose (\$250 versus \$210 at clinic)
 - Subsidy of \$800 for clinical waste disposal per outreach vaccination activity

School type	2017-18	2018-19	Percentage increase compared to 2017-18
KGs/CCCs*	60	186	+ 210%
Primary schools#	65	405	+ 523%

* VSS (Including Enhanced VSS Outreach Vaccination)

School Outreach Vaccination Pilot Programme and VSS (including Enhanced VSS Outreach Vaccination)

Proportion of schools with ILI outbreaks in 2018/19 winter influenza season

School type	Without outreach vaccination	With outreach vaccination	Relative risk
KGs/ CCCs	392 / 879 (44.6%)	51 / 184* (27.7%) ↓ 38%	0.62 (95%CI: 0.49 - 0.79) P = 0.0001
Primary schools	66 / 184 (35.9%)	76 / 403* (18.9%) ↓ 47%	0.53 (95%CI: 0.40 - 0.70) P < 0.0001

Dengue Fever (DF)

Global situation of DF

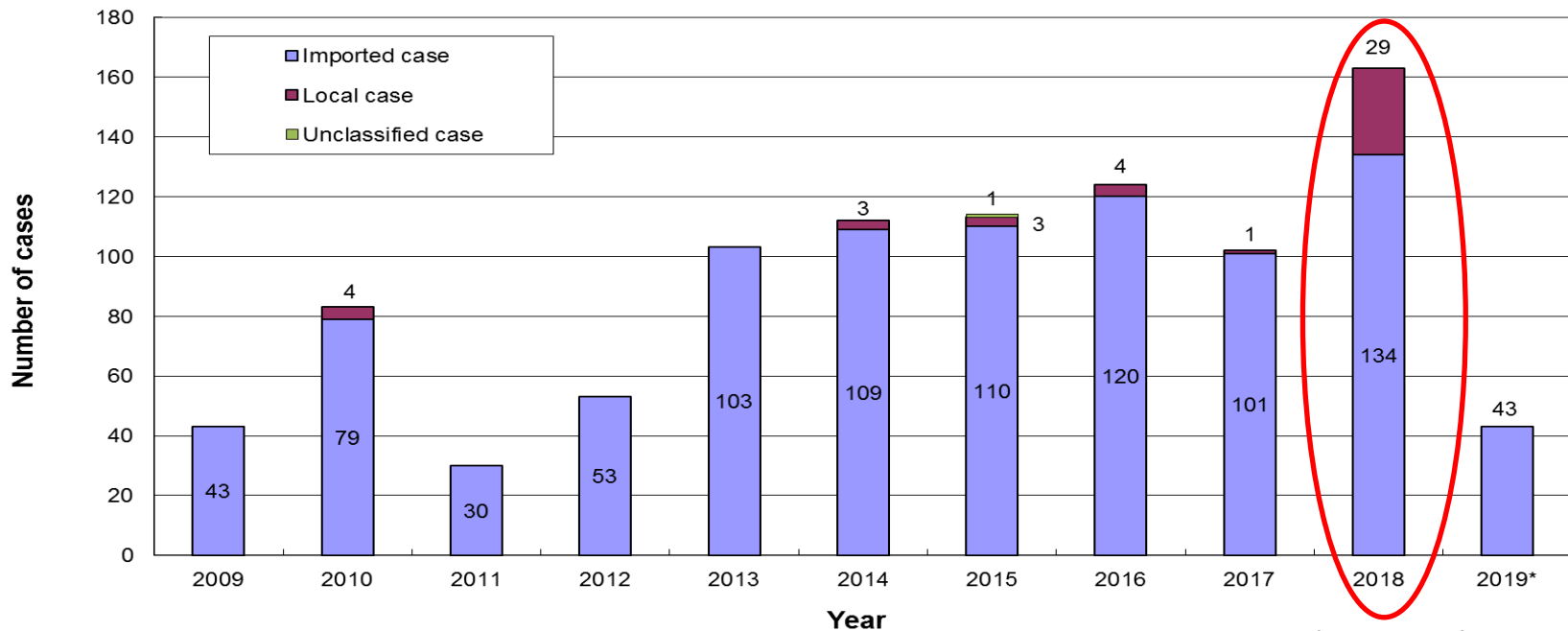
- Listed as one of the 10 threats to global health in 2019 by WHO
- In 2019, marked increase in the number of cases was observed in some Southeast Asian countries

Country	2019 (as of 9 May)	Same period in 2018	% increase compared with 2018
Singapore	2 752	790	248%
Malaysia	43 065	19 348	123%
Vietnam	57 880	17 809	225%
Philippines	67 106	35 247	90%

Local situation of DF

- A total of 927 cases were recorded in past 10 years (2009 - 2018)
 - Annual number of cases ranged from 30 to 163
 - Majority (95.1%) were imported infections
 - Local cases occurred every year during 2014-2018
 - 1- 4 cases per year during 2014 - 2017
 - Unprecedented outbreak of 29 cases in 2018

Annual number of DF cases in HK, 2009-2019*

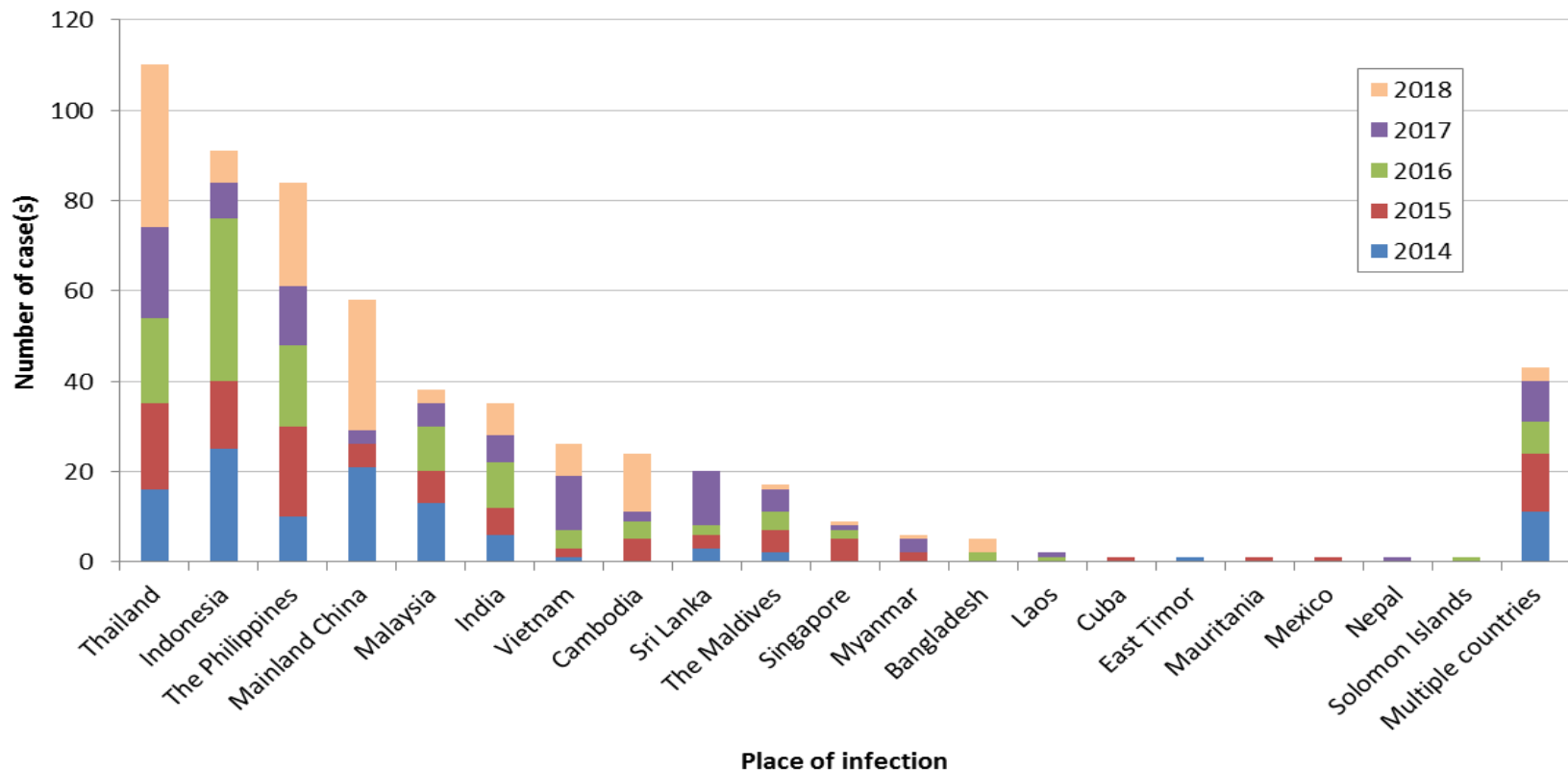


*Provisional figure as of 30 April 2019

Places of infection of imported DF cases

- In the past 5 years (2014-2018), the 3 commonest places of infection of imported DF cases were Thailand (19.2%), Indonesia (15.9%) and the Philippines (14.6%)

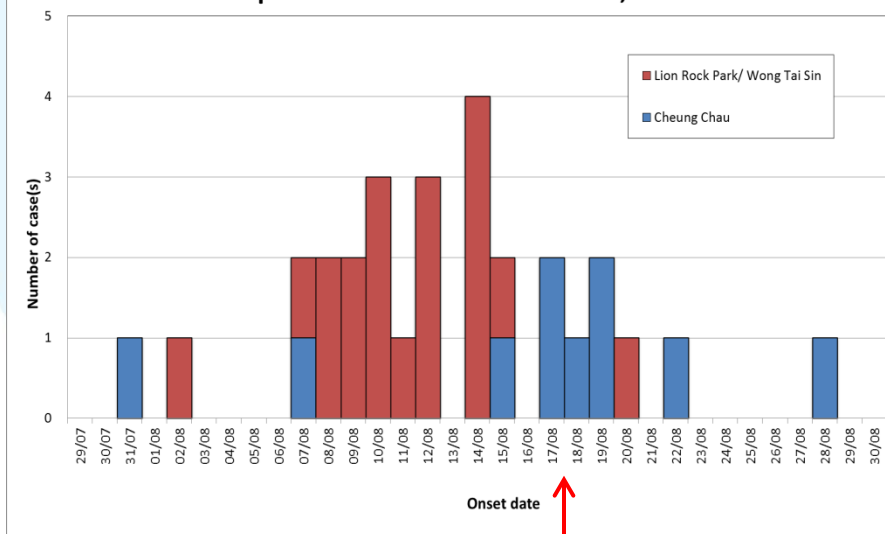
Number of DF cases by place of infection, 2014-2018



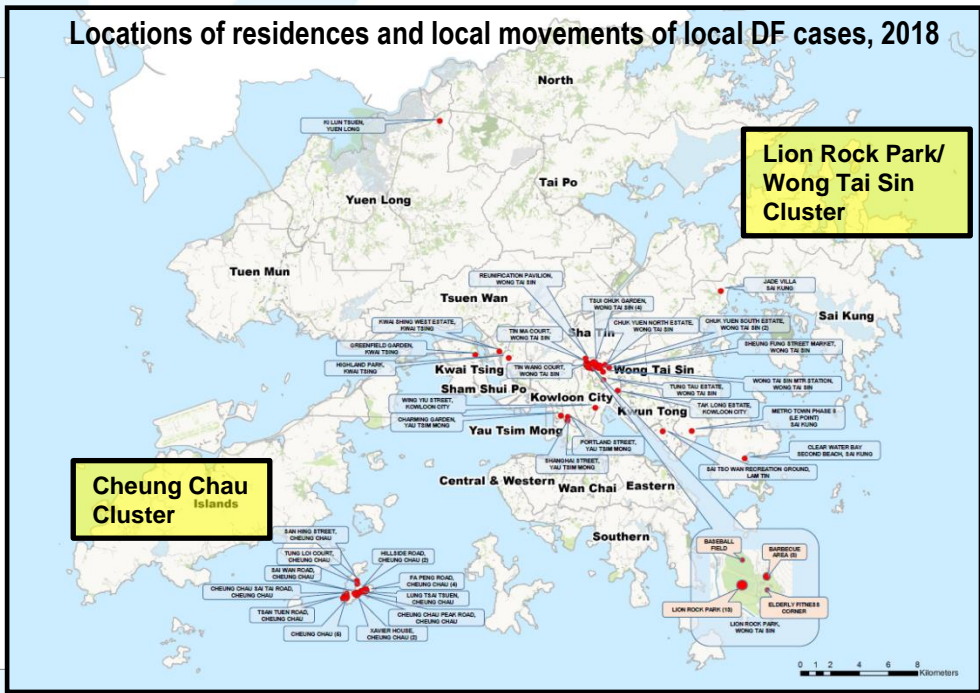
Unprecedented local DF outbreaks in 2018

- A total of 29 local DF cases were confirmed with onset from 31 July to 28 August 2018
- Involved 16 males and 13 females with ages ranging from 17 to 84 years (median: 59 years)
- Epidemiological investigations and genetic sequencing results revealed that they were linked to 2 separate clusters, one in Lion Rock Park/ Wong Tai Sin (19 cases) and the other in Cheung Chau (10 cases)

Epidemic curve of local DF cases, 2018



Closure of Lion Rock Park on 17 Aug



Prevention and control measures

- Enhanced surveillance including activation of the electronic platform “**e-Dengue**” to facilitate reporting of suspected cases by public hospitals
- Prompt diagnosis and clinical management of cases, and isolation in a mosquito-free environment during febrile phase
- Epidemiological investigations and medical surveillance of contacts
- Liaised with FEHD to carry out vector surveys and control measures according to local movements of all cases
- Temporary closure of Lion Rock Park
- Risk communication and enhanced public education
- Intensive mosquito preventive and control campaign across the whole territory of HK

Lessons learnt from the outbreak

- Substantial risk of local transmission and outbreak of DF, in view of:
 - Geographical proximity to dengue endemic areas in Asia
 - High volume of international travellers
 - Presence of the vector *Aedes albopictus* in HK
- Most important prevention and control measures:
 - **Sustained** community-wide anti-mosquito actions especially in summer and rainy season to prevent mosquito proliferation
 - Promoting awareness of the general public on measures to prevent mosquito bites especially during travel to endemic areas
- Preparedness and responses
 - “Preparedness and Response Plan for Dengue Fever” was launched by the Government in April 2019
 - Sets out a framework with a 3-tier response system (Alert / Serious / Emergency) for coordinated efforts among relevant government bureaux/departments and organisations to reduce the public health impact of DF on the local population

Prominent Upsurge of Measles in 2019

Measles cases in HK, 2019 (n = 76)

- Global resurgence since 2018
- **76 confirmed cases** were recorded locally from 1 Jan to 30 May
- Already surpassed the annual number since 2008 (4 - 68 per year)
- Age range: 8 months to 49 years (median 28.5 years)
- Male : female = 48 : 28
- **43 (57%)** cases were involved in 2 household clusters (4 cases) and 2 outbreaks (33 in airport; 6 in a retail shop)
- Majority (70, 92%) were **adult cases**, predominantly in young adults aged 20-29 years (34 cases, 45%), followed by 30-39 years
- Majority (73, 96%) were residents living or working in HK (including foreign domestic helpers and other migrant workers)

Age in years	No. of cases	%
<1	4	6
1-9	1	1
10-19	1	1
20-29	34	45
30-39	20	26
40-49	16	21

Epidemic curve of measles cases in 2019 (n = 76)

33 cases associated with an outbreak among workers at the airport, including:

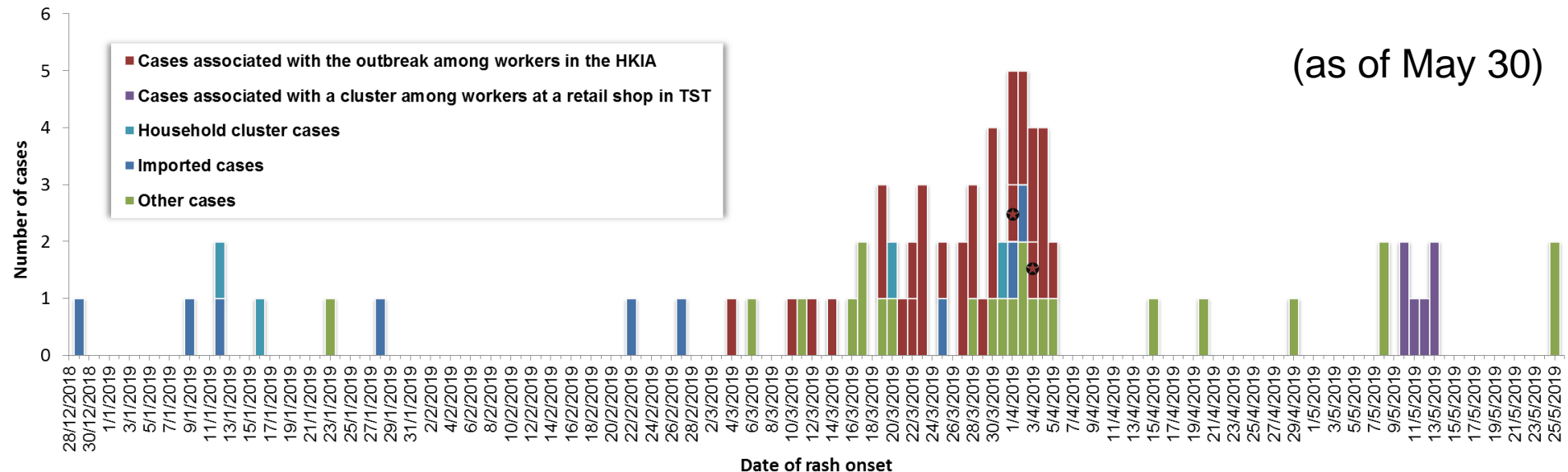
31 cases involving 2 crew members of an airline, 2 airport visitors and 27 airport workers

✪ 2 nosocomial cases involving healthcare workers with exposure to an airport case in a hospital

6 cases involved in an outbreak among workers of a retail shop in Tsim Sha Tsui

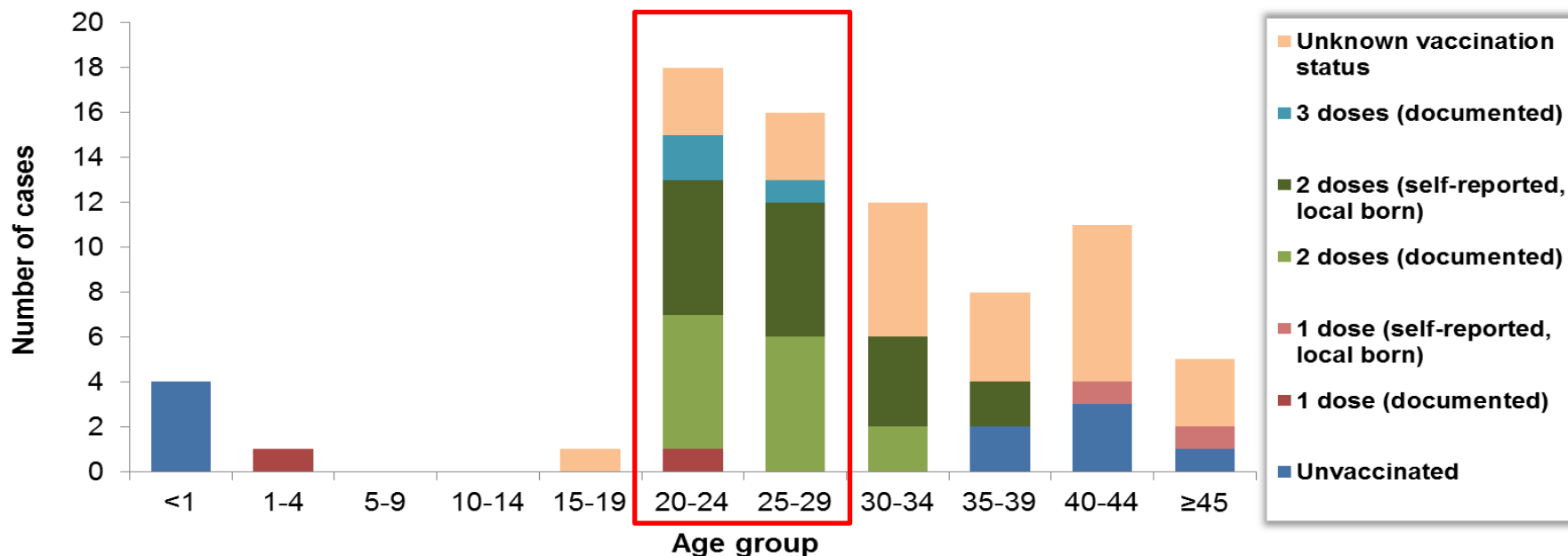
4 cases involved in 2 household clusters with each affecting an infant case & an adult case

33 sporadic cases without obvious epidemiological linkage, majority (25 cases, 81%) had travel history during incubation period



Vaccination status of measles cases in 2019

- **35 cases (46%)** received ≥ 2 doses of measles-containing vaccine (MCV):
 - **17 cases (22%)** had documented evidence of 2 doses (14 cases) or 3 doses (3 cases)
 - **18 cases (24%)** self-reported to have received vaccination according to childhood immunisation programme during childhood (all local-born)
- **4 cases (5%)** received 1 dose of MMR vaccine (2 with documentation and 2 local-born cases by self-reporting)
- **10 cases (13%)** were unvaccinated, including 4 infants aged <1 year who were not due for 1st dose of MMR vaccination
- **27 cases (36%)** had unknown vaccination status



Clinical presentation (n = 76)

- 41 (54%) presented with typical measles (T-Me) while 35 (46%) had modified measles (M-Me)
- All M-Me cases involved adults, aged 20 – 49 years (19 aged 20-29; 11 aged 30-39; 5 aged 40-49)
- Unvaccinated cases were more likely to present with T-Me
- No cases reported complications except one typical measles case with pneumonitis affecting a Filipino teenage tourist with unknown vaccination status
- All cases recovered and were discharged from hospital



Typical measles (T-Me): cases presented with fever, rash, and any of the 3 “C” (cough, coryza or conjunctivitis)

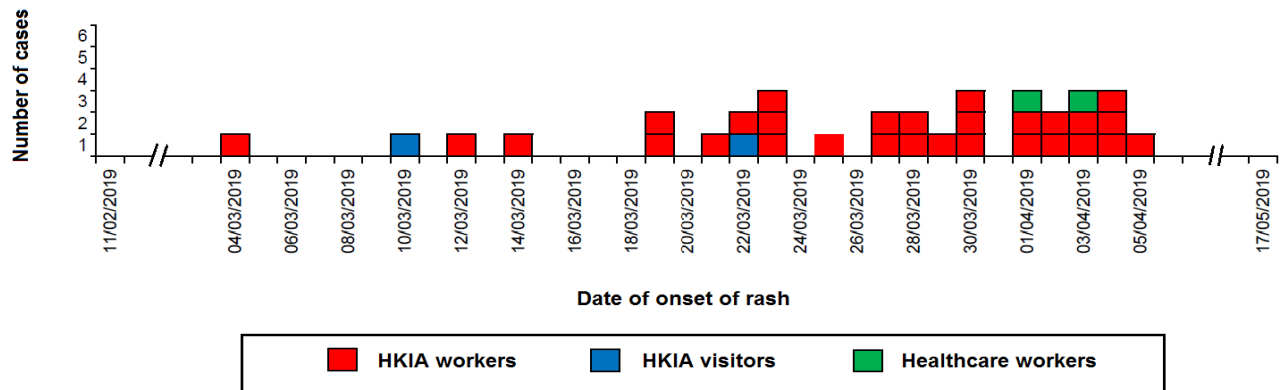
Modified measles (M-Me): cases presented with milder symptoms, without fever or any of the 3 “C”

Vaccination status	T-Me (n=41)	M-Me (n=35)
Unvaccinated	8 (20%)	2 (6%)
≥1 dose (documented & self-report)	18 (44%)	21 (60%)
Unknown	15 (36%)	12 (34%)

Cases related to the airport outbreak (n = 29+2+2)

- **33 cases:** 29 airport workers (including 2 crew members), 2 airport visitors, and 2 cases involving healthcare workers with exposure to a confirmed measles case in a hospital
- 22 male and 11 female, age range 20 - 49 years (median: **25 years**)
- Onset of rash from March 4 - April 5, 2019
- **18 (55%) presented with modified measles; 12 of which were vaccinated** (9 with documentation and 3 local-born self-reported).

Epidemic curve of HKIA associated measles cases in 2019



Comparison with recent airport outbreaks in other places – Japan & Taiwan

	HKIA	Kansai International Airport, Osaka, Japan	Taoyuan International Airport, Taipei, Taiwan
Year	March-April 2019	August-September 2016	March 2018
No. of cases	29	33	12
Affected groups	2 crew members, 27 workers	Airport employees and related contacts	Crew members, airport workers, 1 traveller
Age group of cases	Age range 20 - 49 years (median: 25 years)	26-34 (median: 24)	20-40
Modified measles (%)	15 (52%) [10 had received 2 doses of MMR vaccine]	26 (84%) [13 had received 2 doses of MMR vaccine]	12 (100%)

Sources of infection of the airport outbreak

- The cases worked in a number of different areas.
- Their incubation periods and communicable periods overlapped with one another.
- No single point source could explain the whole outbreak.
- Compatible with multiple introductions with further but limited spread.
- Epidemiological investigations revealed 3 typical measles cases as sources.
- 2 generations of transmission were identified among the cases.
- Transmission stopped at 3rd generation cases.

Lessons learnt from the 2019 upsurge (1)

Outbreak potential

- Global upsurge of measles especially in areas with close ties to HK has posed elevated risk of spill over infection to HK via importation
- Imported cases could cause large-scale local transmission in HK
- Places with higher risk of exposure & measles transmission/outbreak:
 - Airport and tourist attractions (with high volume of international travellers from endemic countries and places with measles outbreaks diluting the herd immunity in specific settings)
 - Healthcare facilities (receiving patients before clinical suspicion)
- Potential pockets of susceptible persons exist in our population, e.g. non-local born unvaccinated adults

Lessons learnt from the 2019 upsurge (2)

Waning immunity among young adults

- A significant proportion of cases in both outbreaks (the airport and retail shop) had completed 2 doses of measles vaccination (either documented or self reported)
- They mainly presented with mild symptoms (i.e. modified measles).
- Serological evidence supported that they were breakthrough infection (secondary vaccine failure) rather than primary infection (primary vaccine failure), including high IgG level in blood samples collected within a few days after onset and lower viral load
- Warrants further examination at international level, including WHO

Way forward in post-elimination era

- Maintain near 100% 2-dose MMR/MMRV coverage under childhood immunisation programme
- Regular assessment of high-risk population groups through serosurveys
- Timely reporting and investigation of suspected cases, including laboratory confirmation and genotyping of cases
- Timely risk communication to public and stakeholders about the latest disease situation and continual promotion on vaccination
- Vaccination recommendations for high risk groups (e.g. international travellers, foreign domestic helpers, migrant workers, immigrants and other non-immune adults especially those not born in HK)
- Supplementary vaccination activities targeting specific groups

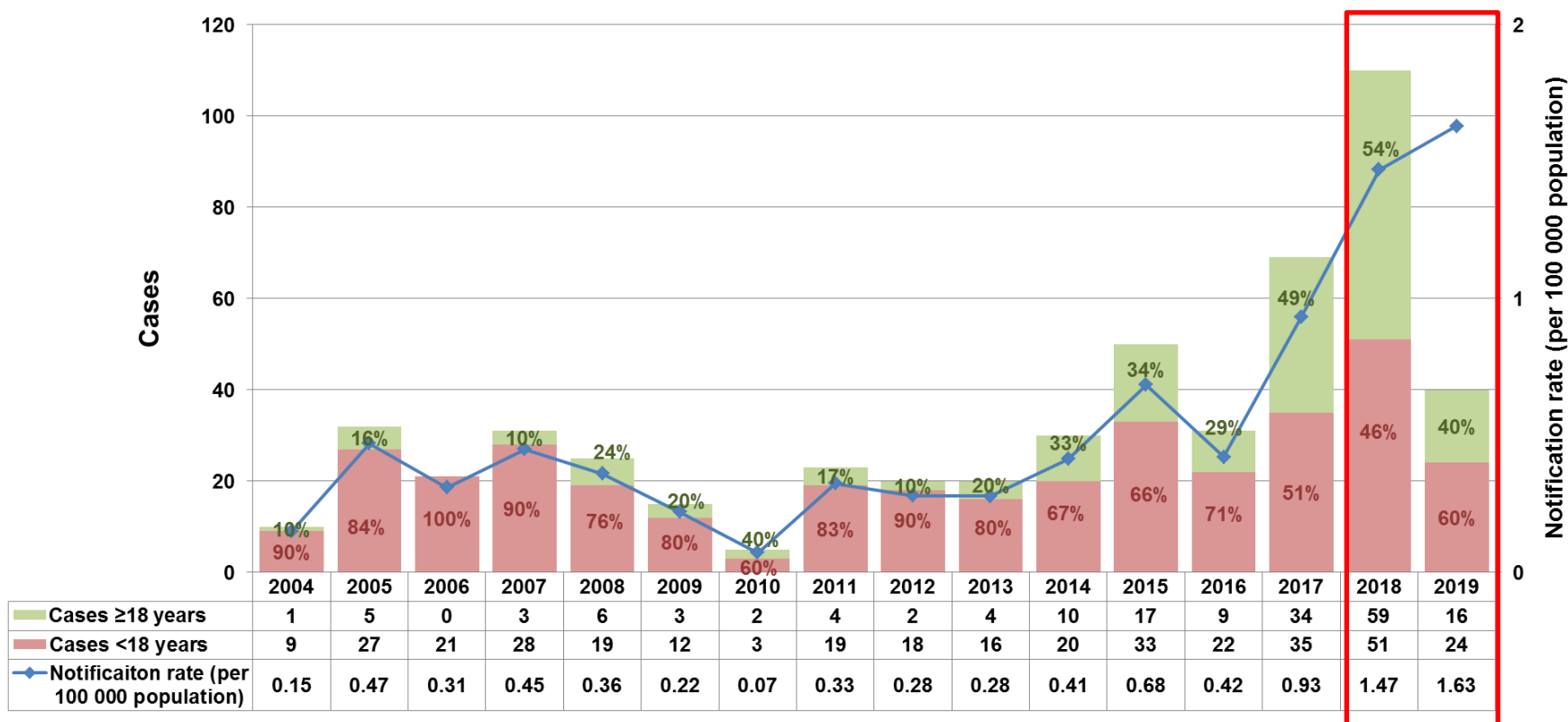
Pertussis and Recommendation on Vaccination for Pregnant Women

Global situation of pertussis

- According to WHO, 143,963 pertussis cases were reported globally in 2017
- Resurgence of pertussis occurred in many developed countries (such as United States, United Kingdom, Australia, Japan) in recent years, predominantly among infants <1 year and adolescents, despite high vaccination coverage
- Possible explanations for this increasing trend
 - Increased awareness among healthcare professionals
 - Wider use of highly sensitive PCR tests for diagnosis, replacing traditional culture
 - Faster waning of immunity induced by **acellular** pertussis vaccines compared with traditional whole cell pertussis vaccines
 - Possible genetic changes in circulating strains of *Bordetella pertussis*

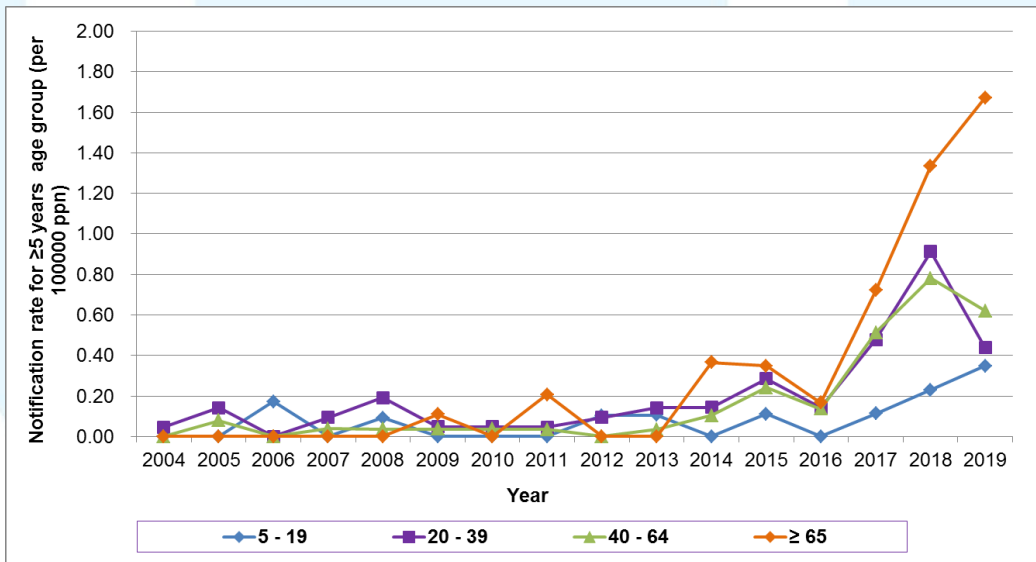
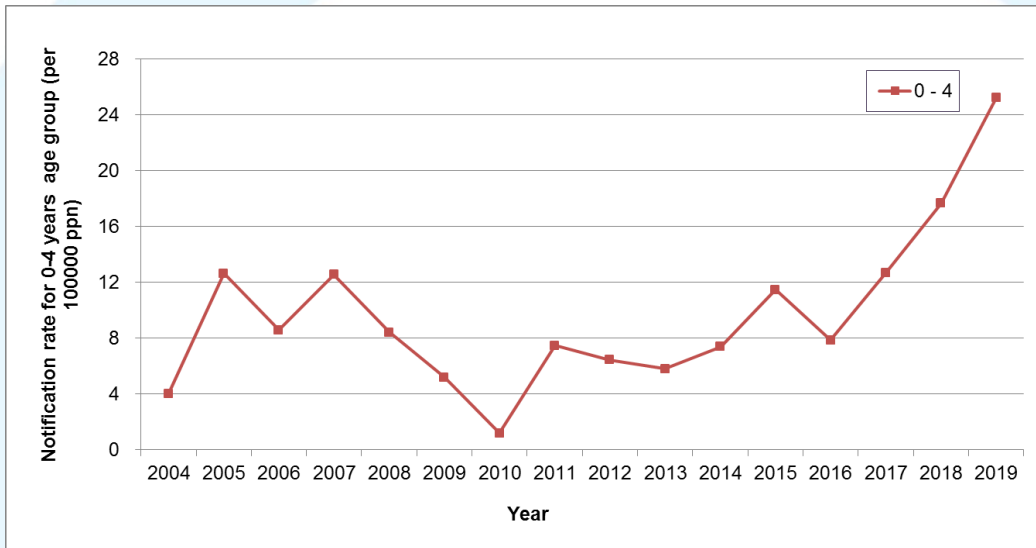
Trend of reported cases of pertussis

- Upsurge of pertussis cases observed since 2017, reached 110 cases in 2018
- Increasing proportion of adult cases, esp. diagnosed in private hospitals
 - About half of the cases affected adults ≥ 18 years since 2017
- Wider use of PCR for diagnosis of clinically suspected cases may have partially contributed to this upsurge



(As of 30/4/2019)

Incidences of pertussis by age group



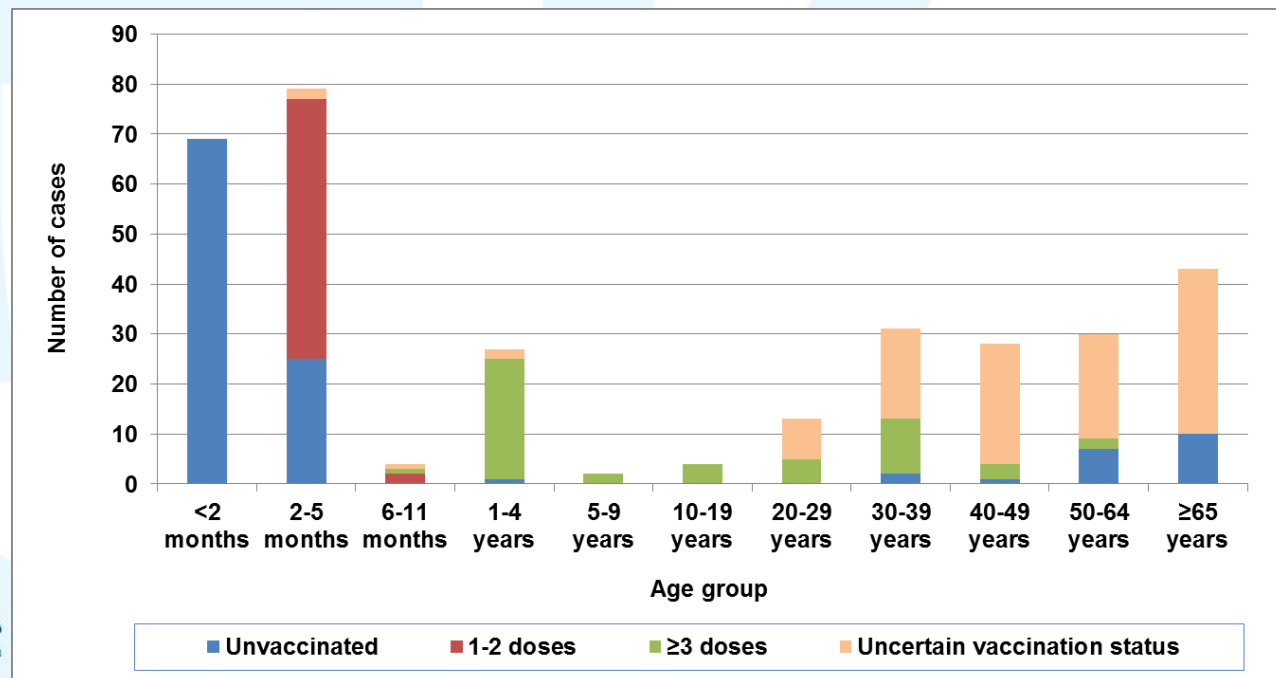
- Incidences of **all age groups** has been on an increasing trend since 2017
- Incidence remained the highest among children aged **0-4 years**, followed by adults aged **65 years or above**
- Incidences among children and adolescents aged **5-19 years** remained at a low level

(As of 30/4/2019)

Age distribution, 2014 - 2019*

Among cases reported from 2014-2019

- ~45% affected infants <6 months who had not completed the 3-dose primary series (21% <2 months who had not reached the recommended age for 1st dose of DTaP-IPV vaccine)
- About 44% affected adults ≥18 years
 - 86% had not received vaccination or with unknown vaccination status
 - 50% were non-local born



Increase in pertussis clusters

Year	2014	2015	2016	2017	2018	2019*
Cluster (size)	3 (2-3)	5 (2-4)	0	7 (2-3)	11 (2-3)	1 (2)
Total affected (proportion of the total cases in the same year)	7 (23%)	13 (26%)	-	17 (25%)	24 (23%)	2 (5%)
Place	Home	Home	-	Home	Home (10) Hospital (1)	Home

(*As of 30/4/2019)

- Number of clusters has also surged since 2017.
- The clusters were generally **small in size** (each affecting 2-3 persons) with almost all occurred in **household setting**.
- The household clusters mostly affected infants, their family members and other household contacts.



Cluster is defined as ≥ 2 pertussis cases with epidemiological linkage.

New recommendations of Scientific Committee on Vaccine Preventable Diseases

1. To provide direct protection for infants against pertussis, pregnant women are recommended to receive one dose of acellular pertussis-containing vaccine during each pregnancy as part and parcel of routine antenatal care regardless of previous vaccination and natural infection history against pertussis.
2. The timing of vaccination is recommended to be anytime in the 2nd or 3rd trimester, preferably before 35 weeks of gestation for transplacental transfer of maternal vaccine-induced antibodies.
3. dTap vaccine is recommended to be used while dTap-IPV vaccine can also be used if available.
4. For women who have not received any pertussis-containing vaccine during pregnancy, they would still be benefited by receiving one dose of dTap or dTap-IPV vaccine as early as possible after delivery, for indirect protection to infants, preferably before discharge from the hospital.

Challenges in local prevention and control of communicable diseases

- Strategy to further boost up seasonal influenza vaccination coverage to reduce the disease burden
- Maintenance of very high uptake of immunisation under CIP in light of proliferation of anti-vaccination movement/vaccine hesitancy in overseas countries
- Maintenance of environmental hygiene, vector and pest control (e.g. mosquitoes, rodents)
- Unpredictable (re) emergence of diseases with potential of local propagation, e.g. DF, measles
- Constant threat of importation of rare diseases with devastating consequences due to high volume of international travellers: MERS, Zika, diphtheria, Ebola, monkeypox....

Way forward for CHP's work

- Underpinnings of 3Rs: Real-time surveillance, Rapid intervention and Responsive risk communication
- Continue to strengthen our public health system, e.g. surveillance systems
- Expect the unexpected: robust emergency preparedness plans with regular drills and exercises
- Enhance vaccination programmes
- Community mobilisation and whole-society participation
- Innovative risk communication and health promotion using social media platforms
- Foster collaboration with external partners, e.g. HA, other government departments, universities, professional bodies, NGOs, WHO, overseas health authorities

Acknowledgements

- Members of our Scientific Committees
- Partners of our sentinel surveillance systems
- Collaborators and partners in public, private, academic and community sectors
- Colleagues of CHP

Thank you