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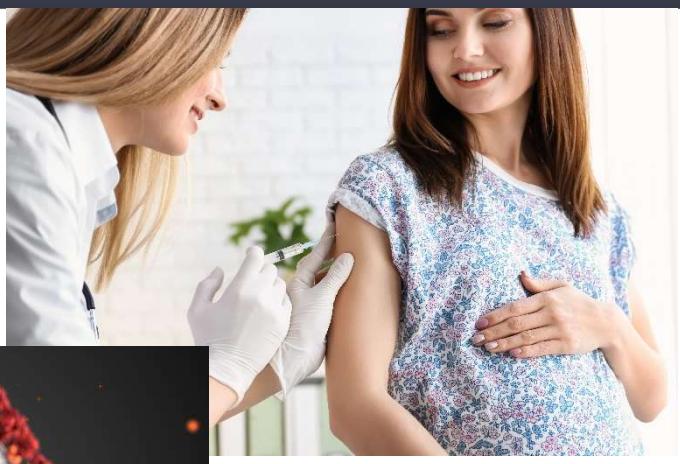

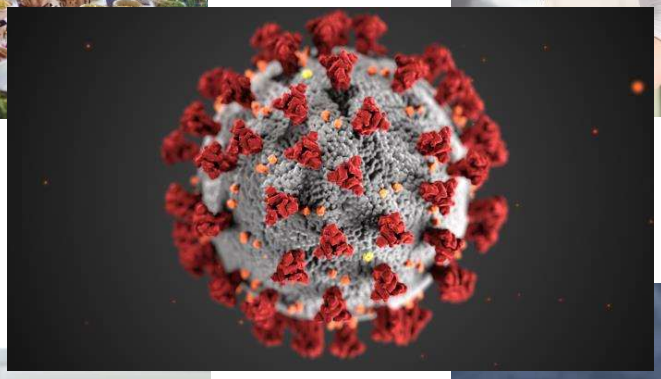

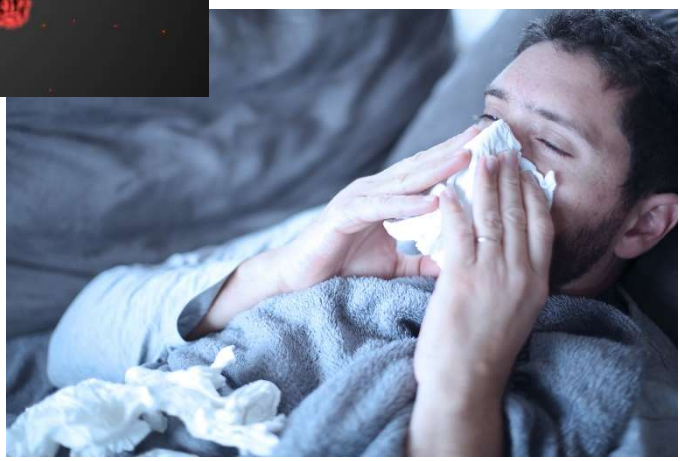

Communicable disease notifications (2018 – 2020) and immunisation

Metro South Health, October 2021

Suggested citation:

Department of Health. *Immunisation and Communicable Disease Notifications (2018-2020): Metro South Health*. Brisbane 2021.

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Executive Summary

The aim of this report is to describe vaccination coverage and notifications of selected communicable diseases (as captured in the Queensland Health Notifiable Conditions System [NoCS]) in residents of the area covered by Metro South Health (MSH).

This is the fifth report for notifiable communicable diseases in MSH. Follow up reports will be produced annually to monitor progress and assist in evaluating public health services and interventions.

Notifications and outbreaks

- From 2018 to 2020 there were, on average, 21,004 valid notifications of communicable disease per year in MSH.
- Notification rates for salmonellosis, cryptosporidiosis, influenza, pertussis, chlamydial infection, gonorrhoea (sexually transmitted infection), infectious syphilis and Ross River virus were significantly lower in MSH than the rest of Queensland.
- Notification rates for rotavirus, varicella, hepatitis C (non-new infection) and tuberculosis were significantly higher compared with the rest of Queensland.
- In 2018 to 2020 Metro South Public Health Unit (MSPHU) investigated an average of 234 outbreaks of communicable disease annually, the majority of which were gastrointestinal illnesses.
- There was a 26% increase in the number of disease outbreaks investigated by MSPHU between 2016-18 and 2018-20 with a major increase (71%) in the number of gastro-intestinal outbreaks in childcare centres. This represented a significant increase in workload for MSPHU.

Emergence of COVID-19

- The first COVID-19 case was recorded in MSH on 3 March 2020 with a total of 303 cases among MSH residents throughout 2020.
- The majority of MSH cases were overseas acquired infections and local transmission was eliminated by the end of 2020.
- The COVID-19 pandemic, and associated public health measures and behaviour changes, appear to have been causal factors in substantial decreases in notifications of conditions including pertussis, influenza, pneumococcal disease, chlamydia (in males only) and dengue fever.
- Rates of these conditions fell probably as a result of a combination of increased infection control measures in the community (social distance, hand washing etc.), lockdowns, border closures and/or decreased testing for pathogens other than COVID-19.

Immunisation and vaccine preventable diseases

- The target of 90% immunisation coverage rate was achieved for all age cohorts for both Aboriginal and Torres Strait Islander and non-Indigenous children (based on June 2021 data).
- The target of 95% coverage was achieved for Indigenous children in 60 to <63 months cohort for 18 successive quarters.

Vaccine preventable diseases

- Pertussis aged standardised rates generally very low since 2014.
- The general trend over the past ten years is of an increasing proportion of pertussis notifications occurring in children and young people (three to 19 years) with a decreasing proportion in children aged less than one year.
- Influenza seasons with extremely high numbers of notifications were seen in 2017 and 2019.
- The 2019 influenza season was very high and broad (started early and finished late) but characterised by low clinical severity.
- Influenza notifications crashed to effectively nil from April 2020 onwards.
- The age standardised notification rate for varicella was significantly higher in MSH than in the rest of Queensland and approximately doubled between 2011 and 2020.

Gastro-enteric diseases

- Notification rates tend to be highest for young children, particularly among those aged under five years of age (and especially for cryptosporidiosis, rotavirus and salmonellosis).
- There was a substantial increase in notification rates of *Campylobacter* across Queensland in 2014 to 2020 with the occurrence of a recognised state-wide outbreak, largely centred in the warmer months.
- There were over 1,700 *Campylobacter* notifications in MSH in 2020.
- A substantial decrease seen in the proportion of rotavirus notifications in infants aged six to <12 months is evidence for rotavirus vaccine efficacy once the course has been completed.

Sexually transmitted and blood borne diseases

- The chlamydia notification rate was significantly lower in MSH than in the rest of Queensland.
- The approximately 5,000 chlamydia notifications recorded per year in MSH represents a significant burden of disease, particularly affecting 15 to 29-year-old females.
- Chlamydia notification counts and rates decreased slightly since 2016 in most age groups except 30 to 39 years (21% increase) and 60+ years (9% increase).
- High rates of gonorrhoea were reported among younger people, especially those aged 20 to 29 years
- A substantial increase in gonorrhoea notifications was recorded in recent years from fewer than 400 per year in 2011 to over 1,500 in 2020.
- The gonorrhoea increase was most notable in those aged 15 to 29 years.

- The infectious syphilis notification rate increased markedly to 2018 but has since decreased slightly.
- Concerning increases in common sexually transmitted infections (chlamydia, gonorrhoea and syphilis) may indicate a move away from safe sex practices, especially in younger adults.

Vector-borne diseases

- Notifications of Dengue fever crashed in 2020 to the lowest level in over ten years, likely as a result of the closure of the Australian international border due to the COVID-19 pandemic.
- Notification rates and counts of both Ross River and Barmah Forest virus doubled in 2020.
- It was not possible to establish a causal link between the observed increases and the COVID-19 pandemic, however it is possible that an increase in local tourism and local outdoor activities as a result of the international border closure may have increased population-level exposure to mosquitos.

Other diseases

- The meningococcal ACWY vaccination program was introduced in July 2017 to provide vaccination to Year 10 students and catch-up vaccination for people aged 15 to 19 years in response to marked increase in serogroup W & Y notifications in Queensland in 2015-2017.
- Following the introduction of the vaccination program, serogroups W & Y each showed a decrease in notifications.
- Meningococcal B continues to comprise the largest proportion of all reported cases of meningococcal disease in Queensland.
- Meningococcal B declined from >70% of all reported cases (2010 to 2014) to about half of all reported cases (2016 to 2019) and increased to over 60% in the first nine months of 2020.
- Legionellosis in MSH has shown no consistent trends over the past decade, however during 2013 there was a noticeable peak in notifications. This reflected increased levels of awareness, testing and notification to MSPHU following publicity at that time.
- Notifications of potential exposure to rabies virus (overseas) in MSH residents increased ten-fold between 2011 and 2019 but dropped markedly in 2020 with the closure of Australia's international borders in response to the COVID-19 pandemic.
- Notifications of potential Australian bat lyssavirus (ABLV) exposures spiked in 2019 possibly as a result of high summer temperatures causing distress to bat populations and members of the public being scratched/bitten when attempting to assist distressed bats.

Introduction

The control of communicable diseases in the local community is predominantly the responsibility of public health physicians, public health nurses, environmental health officers and epidemiologists. This is done through coordination from the Public Health Unit in collaboration with colleagues in hospitals, laboratories, community health centres, private medical practices, local government and other agencies.

This report provides the latest available overview of communicable disease notifications, rates and trends for Metro South Health (MSH) in comparison with the rest of Queensland. It is the fifth communicable disease report aimed to monitor progress and assist in the evaluation of public health services and interventions for the Metro South area.

After a brief description of analytical methodology, the report continues with an overview of notification numbers and rates, followed by a brief description of disease outbreaks and immunisation, including latest available vaccination coverage rates. These give some insight to the work carried out by the Metro South Public Health Unit (MSPHU). Subsequent chapters describe disease specific details under vaccine preventable, gastro-intestinal, sexually transmitted and blood borne, and miscellaneous other diseases. Brief descriptions and available public health actions are given for individual diseases, followed by epidemiological data with some reflective commentary. Data presentation methods are kept similar across diseases, with some variation depending on specific findings (e.g. types of figures included).

Methodology

Communicable disease notifications data were extracted from the Queensland Health Notifiable Conditions System (NoCS) database for:
a) all notifiable conditions (for 2018 to 2020, three years' data), and
b) selected conditions of significance or other interest (for 2011 to 2020, ten years' data).

Average annual notification numbers were calculated using data for the last three-year period (2018 to 2020) to reduce effects of annual fluctuation. Age standardised notification rates were then calculated based on average annual notifications and Australian Bureau of Statistics estimated resident population data extracted from Queensland Health Infobank. The same process was carried out for the Metro South Health (MSH) area and for all of Queensland, separately for females, males and all persons.

Rate ratios were calculated to compare MSH against all of Queensland (as is common practice), and against "rest of Queensland" (i.e. Queensland less MSH). The latter allows more accurate comparison of the MSH data, as numbers (and hence rates) for all of Queensland include MSH (i.e. "self"), which can drive the all of state data to a significant extent given that MSH represents 23% of the state population.

This issue is illustrated by Figure 1 (data from 2011 to 2013), which shows pertussis notifications for under ten year olds to be significantly lower in MSH compared with the rest of Queensland (95% confidence intervals do not overlap), but notifications for all of Queensland fall in between the two. For 40 to 49-year olds, the statistical significance of higher rates in MSH compared with the rest of Queensland is lost when comparing against all of Queensland. Because of these factors, comparisons between MSH and the rest of Queensland are provided throughout this report for age specific notification rates and annual age standardised notification rates.

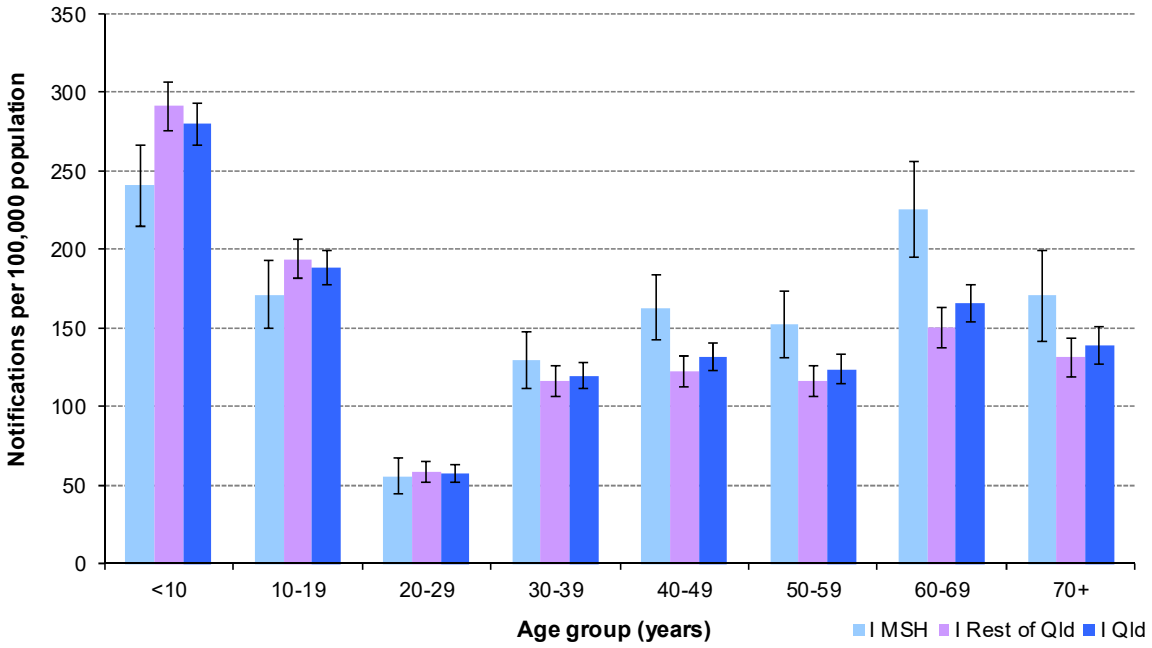


Figure 1: Comparison of age specific notification rates between different geographical areas
Pertussis notifications (2011 to 2013) per 100,000 population: Metro South HHS (light blue), rest of Queensland (lilac), all of Queensland (dark blue) with 95% confidence intervals

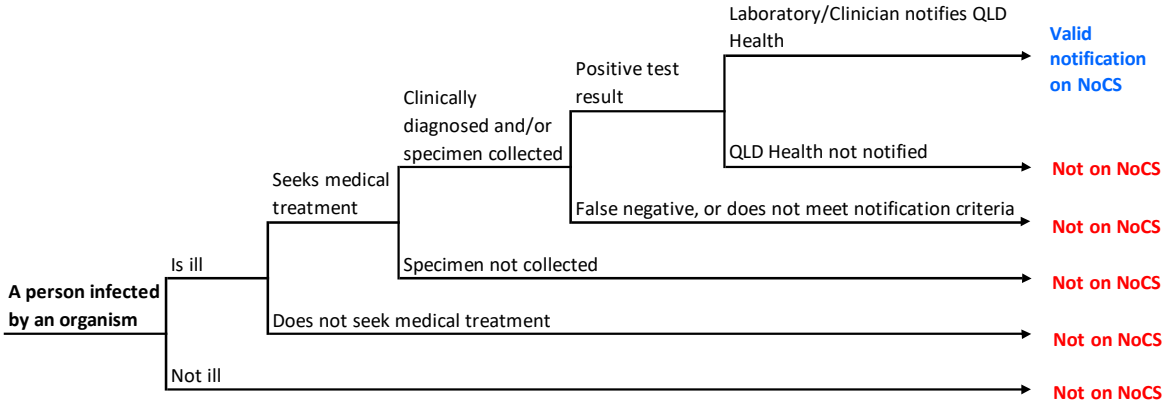
The ten years' data (2011 to 2020) were extracted separately for females, males and all persons by age (five-year and single year age groups) for both MSH and all of Queensland. Age specific notification rates and rate ratios were calculated for MSH, all Queensland and rest of Queensland similar to above. Age standardised notification rates were calculated for total disease counts using the direct method with reference to the Australian 2001 population (from Australian Bureau of Statistics data). To compare age group trends over time, annual notification rates were calculated for each age group (summary charts presented biannually).

Testing for statistical significance (for both three - and ten years' data) was carried out by calculating 95% confidence intervals and/or chi-square testing. Five-year age group data were summarised into ten-year age groups. Summary results were tabulated and descriptive charts produced. All analyses, calculations and data presentations were carried out using MS-Excel™ templates custom-designed for this purpose.

Notified fraction

Only a proportion of the actual number of incident cases of any notifiable disease ever appear as valid notifications on a disease register such as NoCS. The exact proportion, or 'notified fraction' is influenced by various factors and as such is extremely difficult to calculate.

Ideally, every person infected by an organism that causes a notifiable condition would appear in NoCS. However, if an infected individual did not seek medical treatment, or never had a specimen tested then that infected individual would have no opportunity of appearing in NoCS. There are at least five points at which circumstances can occur which lead to an infected individual not appearing in NoCS, these are diagrammatically represented in Figure 2.



* Adapted from Figure 1; *Communicable Diseases Intelligence* Vol 45, 2021[1]

Figure 2: Communicable diseases notifiable fraction*

The counts presented in this report are of notifications to NoCS. The rates presented are notification rates and should not be confused with incidence rates. Because notified cases can only represent a proportion (the 'notified fraction') of the total incidence of any disease, this should be considered when interpreting NoCS data such as that presented in this report. Moreover, the notified fraction varies between diseases and over time, but with notification rates always being lower than true incidence rates for all diseases covered in this report.

Notifications overview

On average there were 21,004 valid notifications of communicable disease per year in MSH between 2018 and 2020. This is lower than the 2015-2017 annual average of 22,141. In addition to this in 2020 there were 303 valid notifications of COVID-19. Notification rates for rotavirus, varicella (all *Herpes zoster* including chickenpox), hepatitis C (non-newly acquired), and tuberculosis were significantly higher in MSH than in the rest of Queensland (Table 1). Conversely, the rates for the following notifiable conditions were significantly lower in MSH compared with the rest of Queensland: salmonellosis, cryptosporidiosis, influenza, pertussis, chlamydial infection, gonococcal infection (sexually transmitted), infectious syphilis and Ross River virus infection

Table 1: Selected notifiable conditions counts and age standardised rates per 100,000 population, Metro South Health and Queensland, 2018 to 2020

Condition	Average annual notifications (2018 to 2020)			
	Average no. of notifications (rate per 100,000 pop)		MSH compared with rest of Queensland	
	Metro South Health	Queensland	Rate ratio (95% confidence interval)	Significant difference MSH *vs* rest of Qld[1]
Gastrointestinal				
Campylobacter	1,869 (156.7)	8,357 (161.8)	0.96 (0.91 - 1.01)	—
Salmonellosis	737 (62.1)	3,786 (74.8)	0.79 (0.73 - 0.85)	🡻
Rotavirus	280 (23.6)	1,045 (20.6)	1.20 (1.04 - 1.37)	🡹
Cryptosporidiosis	123 (10.3)	818 (16.8)	0.55 (0.45 – 0.66)	🡻
Hepatitis A	8 (*)	26 (*)	*	*
Typhoid; Paratyphoid	11 (*)	29 (*)	*	*
E.coli-STEC; HUS	9 (*)	31 (*)	*	*
Vaccine preventable				
Influenza	6,710 (568.3)	29,916 (589.0)	0.95 (0.93 - 0.98)	🡻
Varicella	2,460 (204.3)	9,799 (183.8)	1.15 (1.10 - 1.20)	🡹
Pertussis	171 (14.7)	1,345 (27.4)	0.47 (0.41 - 0.55)	🡻
Pneumococcal disease	67 (5.5)	313 (5.8)	0.92 (0.70 - 1.22)	—
Mumps	8 (*)	186 (3.8)	*	*
Measles	14 (*)	31 (*)	*	*
Rubella	<5 (*)	<5 (*)	*	*
STI / Bloodborne				
Chlamydial infection	4,980 (407.6)	23,467 (480.9)	0.81 (0.78 - 0.83)	🡻
Gonorrhoea (STI)	1,340 (110.5)	5,648 (116.6)	0.93 (0.88 - 0.99)	🡻
Hepatitis C (other)	461 (38.7)	1,768 (35.6)	1.12 (1.01 – 1.25)	🡹
Syphilis (infectious <2 year duration)	192 (16.1)	928 (19.1)	0.80 (0.68 - 0.93)	🡻
Hepatitis C (newly acquired)	117 (9.4)	462 (9.5)	0.99 (0.81 - 1.23)	—
Hepatitis B (newly acquired)	9 (*)	46 (*)	*	*
Other				
COVID-19 [2]	303 (25.0)	1,185 (22.7)	1.14 (1.00 – 1.30)	—
Ross River virus[3]	299 (25.3)	2,265 (44.3)	0.50 (0.45 - 0.57)	🡻
Potential rabies exposure	83 (6.9)	288 (5.8)	1.28 (0.99 - 1.65)	—
Potential Aust. bat lyssa virus exposure	75 (6.3)	389 (7.6)	0.78 (0.61 - 1.01)	—
Tuberculosis	60 (4.9)	155 (3.0)	1.98 (1.44 - 2.73)	🡹
Dengue fever [4]	41 (*)	148 (2.9)	1.23 (0.86 - 1.77)	—
Q fever	23 (*)	221 (4.2)	*	*
Barmah Forest virus [3]	25 (*)	264 (5.1)	*	*
Malaria falciparum [4]	16 (*)	58 (1.2)	*	*
Malaria (other) [4]	8 (*)	36 (*)	*	*
Meningococcal disease (invasive)	8 (*)	48 (*)	*	*
Legionella [3]	15 (*)	63 (1.1)	*	*
Zika virus [4]	0 (0)	0 (0)	*	—

Notes:

1 – MSH to rest of state comparison is based on relative risk

2 – Data from 2020 only: no cases in previous years

3 – Includes both valid and probable cases

4 – None acquired locally

🡹 MSH rate statistically significantly higher than rest of Queensland;
🡻 MSH rate statistically significantly lower than rest of Queensland;
— no statistically significant difference between MSH and rest of Queensland
* - Count too low for accurate calculation

Outbreak Investigations

Apart from controlling the spread of communicable diseases on a case by case basis, staff at the Metro South Public Health Unit (MSPHU) are involved in communicable disease outbreak investigation, management and control activities (including outbreaks of food and water borne illnesses). Depending on the nature, extent and setting of an outbreak, its management may be undertaken by single or multiple teams within MSPHU, and may involve external stakeholders (e.g. local government authorities, other public health units within or outside of Queensland, or other statewide or national agencies such as OzFoodNet and Safe Food Queensland as well as significant laboratory support from Queensland Forensic and Scientific Services and other Queensland Health and private laboratories).

Most outbreaks investigated and managed by MSPHU are gastro-intestinal in nature, occurring primarily in childcare centres (CCC) or residential aged care facilities (RACF). A significant number of respiratory disease outbreaks, usually in RACFs, are also investigated. Together these represent the most important outbreak-related disease burden on the community and the greatest workload for the PHU. However, it should be noted that MSPHU is involved in the investigation and management of outbreaks of other diseases. The most common, prior to 2018 was hand, foot and mouth disease in childcare centres with an average of 18 outbreaks per year from 2014 to 2016. From August 2017 onwards, however MSPHU ceased involvement in the management of these outbreaks instead providing information and general support only. MSPHU also investigates occasional outbreaks of diseases such as shingles (in RACFs), Q-fever, measles and invasive group A Streptococcal disease (IGAS).

The average annual number of outbreaks (gastro-intestinal and respiratory only) investigated and managed by the MSPHU during the three years 2018 to 2020 is presented in Table 2, with a comparison to 2016 to 2018 and 2013 to 2015. In 2018 to 2020 a total of 701 outbreaks were investigated in the settings noted, with an annual average of 187 gastro-intestinal and 47 respiratory illness investigations during the three-year period.

Table 2: Average annual outbreak investigations by setting, 2018-2020, 2016-2018 and 2013-2015, MSPHU

	Gastrointestinal			Respiratory		
Outbreak setting	**2018-2020**	**2016-2018**	**2013-2015**	**2018-2020**	**2016-2018**	**2013-2015**
General / community	**9**	14	19	**0**	0	0
Residential aged care facilities	**28**	35	46	**46**	41	4
Childcare centres	**144**	84	46	**0**	**<1**	**<1**
Schools*	**4**	87	5	**<1**	1	1
Other	**1**	2	2	**0**	1	0
Total	**187**	1437	119	**47**	43	5

* A number of the outbreaks investigated in schools were in special schools which are followed up closely, in the same manner as a childcare centre outbreak

Between 2013-2015 and 2016-2018 there was a 21% increase in the number of gastrointestinal outbreaks reported to and investigated by MSPHU. This was followed by a further 31% increase to 2018-2020 (Table 2). The increase was found entirely in CCCs where average numbers increased from 85 to 144 per year (70% increase) in 2018-2020. In all other settings the average number of outbreaks decreased in 2018-2020 (Table 2). While much of the increase in CCC outbreaks is likely a reflection of outbreaks of gastrointestinal infections in their catchment populations, at least some of the increase is due to an increase in willingness to report. Many established CCCs reported outbreaks for the first time, particularly in 2020. This may have reflected an increased awareness of the issue of infection transmission and/or an increased usage of hand sanitiser (not effective against Norovirus) in place of hand washing with soap as both a result of the COVID-19 pandemic.

Respiratory outbreaks in RACFs experienced a major increase from an average four per year in 2013-2015 to 41 per year in 2016-2018 and 46 annually in 2018-2020. The high numbers of respiratory outbreaks reflect the major influenza seasons that Queensland experienced in 2017 and 2019. Following the start of the COVID-19 pandemic in MSPHU in March 2020 the number of respiratory outbreaks in RACFs dropped to extremely low levels, as a result of a combination of lockdowns, increased social distancing and infection control measures and the lack of influenza circulating in the community following the closure of international borders.

While the largest number of outbreaks investigated by MSPHU occurred in aged care and childcare facilities, many of the general or community outbreaks (e.g. restaurants, food outlets, common functions etc.) involved multiple teams as well as external stakeholders generating a much higher relative workload.

The increases in numbers of outbreaks investigated reflect a combination of real increases in disease prevalence within the community and an increase in the reporting of outbreaks to MSPHU. However, irrespective of the cause of the increase, it represents a significant increase in the workload of MSPHU over the period from 2018 to 2020.

The numbers of outbreaks presented in this report as investigated by MSPHU will represent only a fraction of those which actually occur in the community. Many outbreaks (e.g. *Salmonella*, Norovirus, Influenza etc.) go unreported and/or undetected for multiple reasons, similar to those outlined in Figure 2.

Immunisation

Immunisation is a scientifically proven and cost- effective approach to protect individuals and communities against vaccine-preventable diseases. It reduces the burden of infectious diseases by increasing the overall level of immunity in the population, thereby minimising the spread of infection. The World Health Organization considers immunisation as one of most effective public health interventions of modern times and a comprehensive vaccination program 'a cornerstone of good public health'[2].

Immunisation program

The current 'Immunisation Schedule Queensland' and details of the immunisation program are available on the following Queensland Government websites[3]: Qld Immunisation Schedule; Qld Government Immunisation website. The Australian Government Immunisation website[4] contains information on the national immunisation program. The online version of the Australian Immunisation Handbook[5] provides clinical guidelines for healthcare professionals and others about using vaccines safely and effectively.

Child vaccination coverage

The performance of the immunisation program nationally, across states and territories as well as by HHS or other local areas is measured by vaccination coverage. This is reported at the key age-specific milestones of 12, 24 and 60 months. Queensland's target is to have 95% of all children fully immunised at one year, two years and five years of age[6].

Immunisation coverage rates for the MSH area, as at 30 June 2021, are summarised in Table 3, comparing performance against all of Queensland and Australia for both Aboriginal & Torres Strait Islander (Indigenous) and non-Indigenous children. At each milestone >90% coverage was achieved in MSH and the 95% target was reached for Indigenous children at 60 to less than 63 months of age. This represented the 18th successive quarter at which Indigenous children in this cohort had reached the target rate.

Table 3: Vaccination coverage rates (30/06/2021) by age cohort, Metro South Health compared with Queensland and Australia (Data from the Australian Immunisation Register, supplied via Queensland Health)

Age cohort / Geographical area	12-<15 Months	24 - <27 Months	60 - <63 Months
	% Fully vaccinated (No. in cohort)	% Fully vaccinated (No. in cohort)	% Fully vaccinated (No. in cohort)
1-Total			
Metro South HHS	**94.5 (3,668)**	**93.0 (3,780)**	**94.6 (4,004)**
Queensland	94.3 (14,562)	93.0 (15,106)	94.3 (16,740)
Australia	94.8 (72,019)	92.8 (74,338)	94.9 (81,303)
2-Indigenous			
Metro South HHS	**91.4 (245)**	**94.5 (256)**	**96.2 (236)**
Queensland	92.5 (1,581)	93.2 (1,604)	96.1 (1,583)
Australia	92.6 (5,407)	92.0 (5,475)	96.8 (5,184)
3-Non-Indigenous			
Metro South HHS	**94.7 (3,423)**	**92.8 (3,524)**	**94.5 (3,768)**
Queensland	94.5 (12,981)	92.9 (13,502)	94.1 (15,157)
Australia	94.9 (66,612)	91.9 (68,863)	94.8 (76,119)

Impact of COVID-19 pandemic

The COVID-19 pandemic does not appear to have had any appreciable negative impact on childhood vaccination rates within MSH. While some quarters in 2020 did record slightly decreased rates in some age cohorts, none of these decreases were sustained and appear to simply reflect the quarter-to-quarter variation which is part of the standard pattern of vaccination rates.

By the end of quarter 2 of 2021 both Indigenous and all children rates across all three age cohorts are had maintained their usual trends showing either marginal increases or stability.

Emerging communicable diseases and issues

Novel pathogens continue to emerge worldwide, and can spread rapidly through global travel. Recent examples include SARS coronavirus and pandemic influenza virus. Previously controlled diseases are able to re-emerge quickly when immunisation rates drop (e.g. interrupted polio vaccination campaigns, reduced uptake of measles vaccination due to false fears) or acquired immunity is not long-lasting (e.g. waning pertussis immunity following natural disease or vaccination). Hence, ongoing surveillance, vigilance and preparation is needed at all levels of the health service.

The most recent disease to emerge and have a global impact has been COVID-19.

COVID-19

On 30 January 2020 the World Health Organization (WHO) declared a Public Health Emergency of International Concern (PHEIC) for the novel coronavirus now known as SARS-CoV-2[7]. COVID-19 is the disease caused by SARS-CoV-2. Current evidence indicates that the virus spreads mainly between people in close contact with each other (typically within one metre). A person can be infected when aerosols or droplets containing the virus are inhaled or come directly into contact with the eyes, nose or mouth[8].

Most people infected with the virus experience mild to moderate respiratory illness and recover without requiring hospitalisation or special treatment. Older individuals and those with underlying medical problems are more likely to develop serious illness. The most common symptoms include fever, dry cough and fatigue, while muscle or joint pain, nasal congestion, sore throat, nausea or vomiting, diarrhoea, conjunctivitis, headache, loss of taste or smell, chills and a skin rash[8]. Symptoms requiring immediate medical attention include shortness of breath, chest pain or pressure and loss of speech or movement[8]. Australian data from 2021 indicates that approximately 10% of cases were hospitalised and 2% admitted to intensive care[9]. In January to August 2021 the overall case fatality rate was 1%[9].

Up to date information about COVID-19 is available from the following websites:

- WHO: https://covid19.who.int/
- Australian Department of Health and Ageing: https://www.health.gov.au/resources/collections/novel-coronavirus-2019-ncov-resources
- CDC-USA: https://www.cdc.gov/coronavirus/2019-ncov/index.html

It is believed that SARS-CoV-2 began infecting humans in late 2019 in Wuhan, China. The first confirmed case in Australia was confirmed on 25 January 2020 in Victoria in a returned traveller from Wuhan[10]. Queensland recorded its first case, a Chinese national from Wuhan, four days later on 29 January in Gold Coast HHS[10]. The first case identified in MSH was a returned overseas traveller on 3 March 2020.

The daily number of cases in MSH rose quickly through March 2020, peaking at 22 notifications on 27 March (Figure 3). From March to June 2020 the majority of the total of 268 cases in MSH were overseas acquired with just 19% acquired in Australia (Figure 3). Daily case numbers declined through late March

and April following the decision by the federal government to close Australian borders to all non-citizens and non-residents from 20 March 2020 onwards[11].

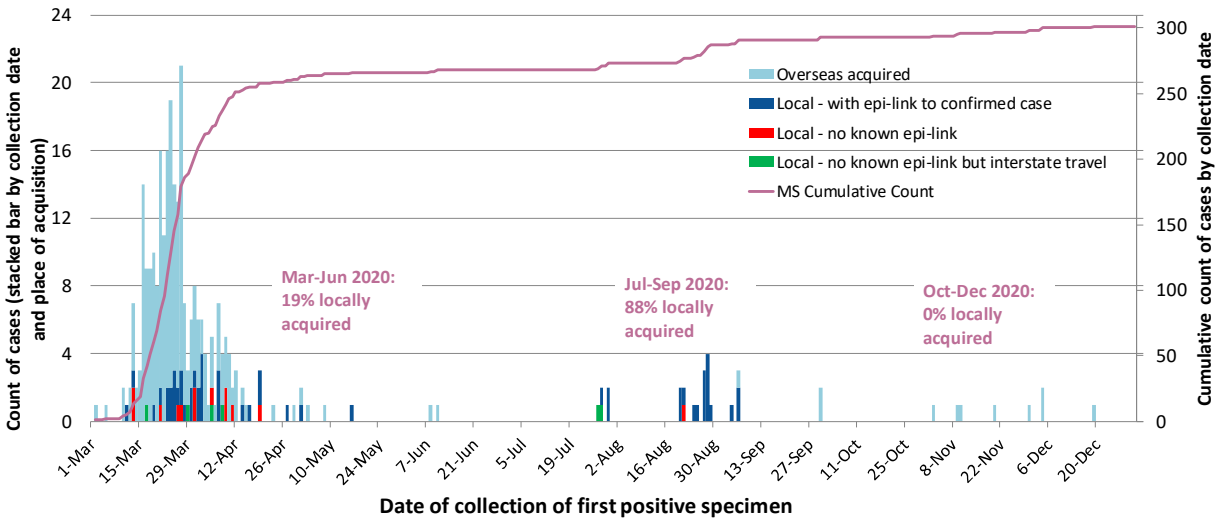


Figure 3: Daily and cumulative counts of COVID-19 cases by place of acquisition, Metro South Health, 1 March to 31 December 2020

From July to September 2020 there was a total of 25 cases in MS residents with the majority (88%) locally acquired (Figure 3). MSH experienced two local outbreaks in July and August/September 2020. The first was the result of an infectious individual returning illegally from an interstate hotspot without quarantining. It was not possible to determine definitively the origin of the second outbreak however genomic evidence and a tenuous epi-link were suggestive that it derived from the earlier outbreak.

In October to December 2020 there were just eight cases in MS residents (Figure 3), all of whom were overseas arrivals housed in hotel quarantine while infectious in Australia.

By the end of 2020 a combination of international border closures, temporary state border closures, local area lockdowns, hotel quarantine for international arrivals, contact tracing and personal-level infection control measures including social distancing enabled MSH (and the rest of Queensland) to eliminate local transmission of COVID-19.

Overall in 2020 there were 303 valid notifications of COVID-19 among MSH residents. The age standardised notification rate was 25 per 100,000 population, which was not significantly different from the rate for the rest of Queensland (22 per 100,000) (Appendix 1: Table 1).The majority of cases were in the age range 20 to 69 years (86%) and rates were similar for males and females (24 and 26 per 100,000 respectively).

Vaccine Preventable Diseases

Only selected vaccine preventable diseases are covered in this report. Diseases that have very low notification rates due to high immunisation coverage, such as measles, mumps and rubella are not included. Vaccination is also available for some diseases covered under other sections further below, but these are usually for only selected population groups or certain strains of the disease.

Pertussis

Key findings 2018 to 2020:

- average of 171 pertussis notifications per year among MSH residents
- age standardised rate in MSH (15 per 100,000) significantly lower than rest of Queensland rate
- age specific rates in MSH lower than the rest of Queensland
- age standardised rates generally very low since 2014
- general trend over the past ten years of an increasing proportion of pertussis notifications occurring in children and young people aged three to 19 years and a decreasing proportion of notifications in children aged less than one year
- drop in cases in 2020 likely largely attributable to the impact of the COVID-19 pandemic

Pertussis (commonly known as whooping cough) is a highly contagious respiratory infection caused by the bacterium *Bordetella pertussis*. For adolescents and adults, the infection causes a persistent cough, however, it can be life threatening for babies and young children. Despite an effective and established immunisation program, and a significant decline in morbidity and mortality from pertussis, epidemics still occur in Australia, the most recent between 2008 and 2012[5].

Effective prevention is achieved through immunisation (childhood, adolescents, pregnant women, parents of newborn children, carers of babies/children, healthcare workers), but immunity either from disease exposure or immunisation is not lifelong. Public health action focuses on preventing disease in infants, who are the most vulnerable to severe illness and mortality from the infection.

Pertussis vaccinations are available under the National Immunisation Program (NIP) for children at 2, 4, 6, 18 months and 4 years of age (as part of combination vaccines). The additional booster dose at 18 months was added to the NIP in March 2016. An adolescent booster dose is available via school-based programs (age of delivery for school-based immunisation programs varies by state and territory). Vaccination of pregnant women is highly recommended at between 20 and 32 weeks of pregnancy and is covered by the NIP.

On average there were 171 notifications of pertussis per year among MSH residents during the period 2018 to 2020. The age standardised notification rate for pertussis in MSH was 15 per 100,000 population, which was significantly lower (approximately half) than the rate in the rest of Queensland (31 per 100,000).

Age specific notification rates were significantly lower in MSH than in the rest of Queensland for those aged under fifteen years and 40 to 49 years (Figure 4; Appendix 1: Table 2). In all other age groups there were no significant differences between MSH and the rest of Queensland. Notification rates peaked in those aged five to nine years and then decreased with increasing age (Figure 4). The greatest decrease in both rates and numbers of notifications (of over 50%) was between the 10 to 14 years and 15 to 19 years age groups (Figure 4).

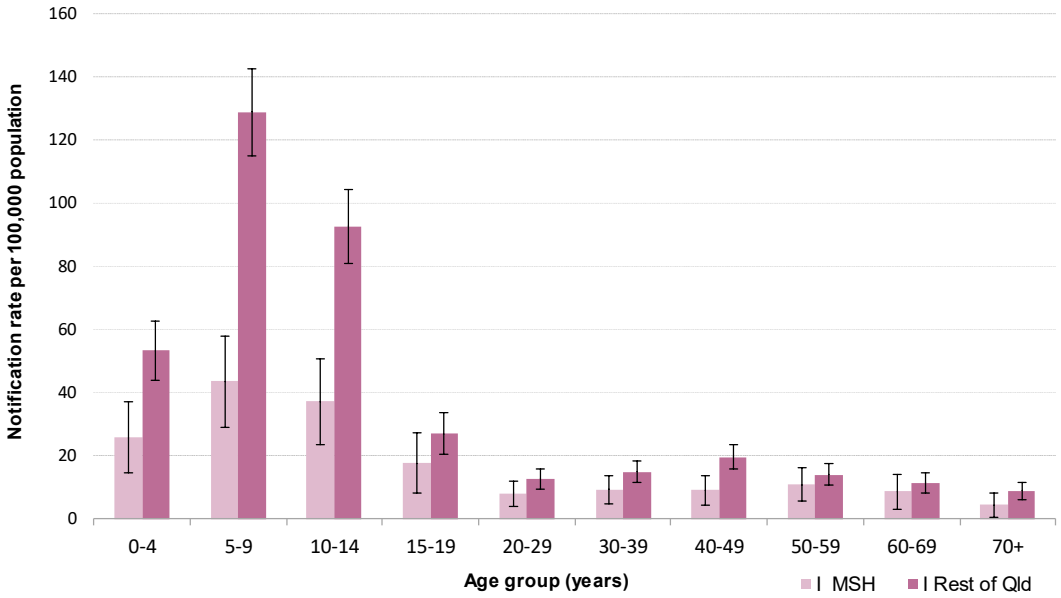


Figure 4: Pertussis age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)

There was no significant difference in overall notification rate between males and females in MSH (Table 4). However, across Queensland, notification rates were significantly higher (14% higher) in females than males (Table 4). When broken down by age groups, Queensland rates were significantly higher in females than males in age groups between 30 and 49 years (Table 4). The lack of statistically significant differences between the sexes in ten-year age groups in MSH is due to the small numbers of notifications.

Table 4: Pertussis average annual notifications and rates by sex with female to male rate ratio comparisons, Metro South Health and Queensland, 2018 to 2020**

Age group (years)	Metro South Health				Queensland - All			
	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.
	Females	Males			Females	Males		
<10	26 (34.2)	28 (35.1)	0.97 (0.57 - 1.66)	—	263 (82.6)	250 (74.7)	1.11 (0.93 - 1.31)	—
10-19	19 (25.8)	23 (29.3)	0.88 (0.48 - 1.62)	—	181 (56.9)	166 (49.5)	1.15 (0.93 - 1.42)	—
20-29	9 (9.5)	6 (6.5)	1.46 (0.52 - 4.10)	—	44 (12.4)	37 (10.4)	1.20 (0.77 - 1.85)	—
30-39	11 (11.7)	6 (6.8)	1.72 (0.64 - 4.62)	—	58 (16.1)	36 (10.6)	1.52 (1.01 - 2.30)	↑
40-49	9 (11.5)	5 (6.4)	1.80 (0.62 - 5.25)	—	71 (20.9)	42 (12.9)	1.61 (1.11 - 2.35)	↑
50-59	8 (11.3)	7 (10.4)	1.09 (0.39 - 3.00)	—	45 (13.9)	39 (12.6)	1.10 (0.72 - 1.69)	—
60-69	5 (9.5)	<5 (#)	#	#	33 (12.1)	25 (9.6)	1.27 (0.75 - 2.13)	—
70+	<5 (#)	<5 (#)	#	#	21 (7.3)	23 (8.8)	0.83 (0.46 - 1.50)	—
Total	90 (15.1)	81 (14.3)	1.07 (0.82 - 1.39)	—	716 (28.9)	618 (25.4)	1.14 (1.02 - 1.27)	↑

* ↑ Females statistically significantly higher than males; ↓ Females statistically significantly lower than males;
— no statistically significant difference between females and males; # Not calculated because age group count fewer than 5
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Age standardised notification rates for pertussis were relatively stable for several years prior to 2009[11]. A prolonged epidemic from 2009 to 2012 saw counts and rates peaking in 2011[12] with over 1,900 notifications recorded in MSH (Figure 5). By 2013 it was generally considered that this epidemic was at an end, although it was not until 2014 that rates and counts returned to the levels seen in pre-epidemic years.

The decline in notifications observed between 2016 and 2017, at least in part, may be attributed to the introduction of an additional diphtheria-tetanus-pertussis booster vaccine at 18 months of age to the National Immunisation Program from March 2016 onwards. A further major decline was recorded in 2020 which is likely the result of factors related to the COVID-19 pandemic: both reduced transmission owing to lock down and social distancing and reduced testing for pathogens other than COVID-19.

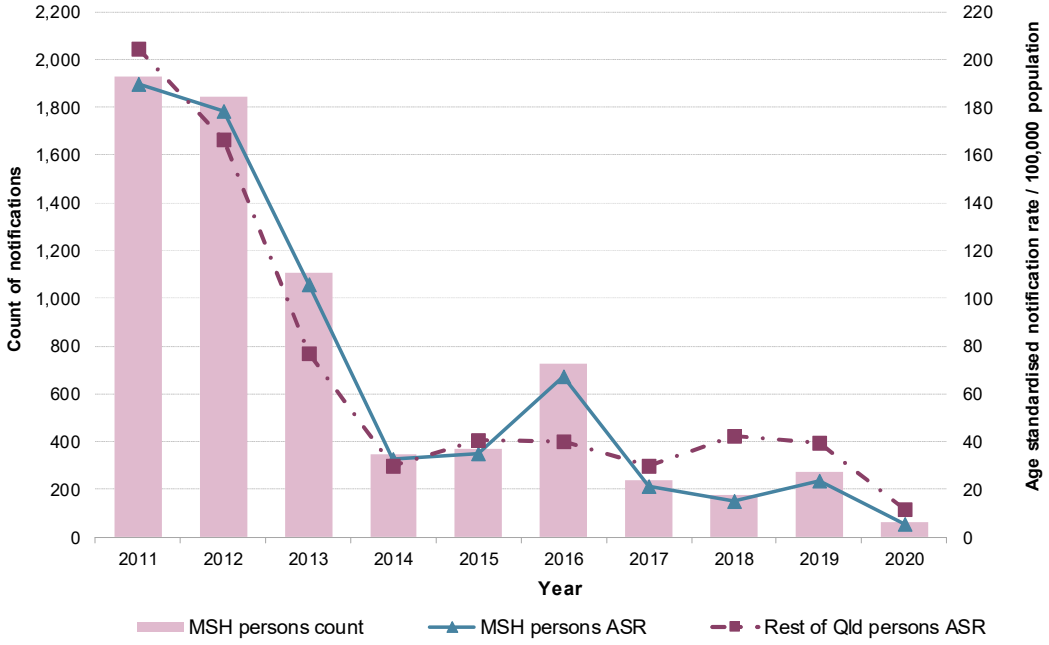


Figure 5: Pertussis notification counts (Metro South Health) and age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

The topographic map (Figure 6) illustrates age specific variations in part of the most recent (2009 to 2012) pertussis epidemic in the MSH area. While rates became very high in children and high in those aged 55 to 74 years over this period, of note is the negligible increase in notifications rates among those aged 20 to 29 years. This could be explained by relatively low testing rates in this age group, better disease protection from vaccination or other factors. The map also illustrates that following the epidemic, higher rates of pertussis were restricted to age groups under 15 years.

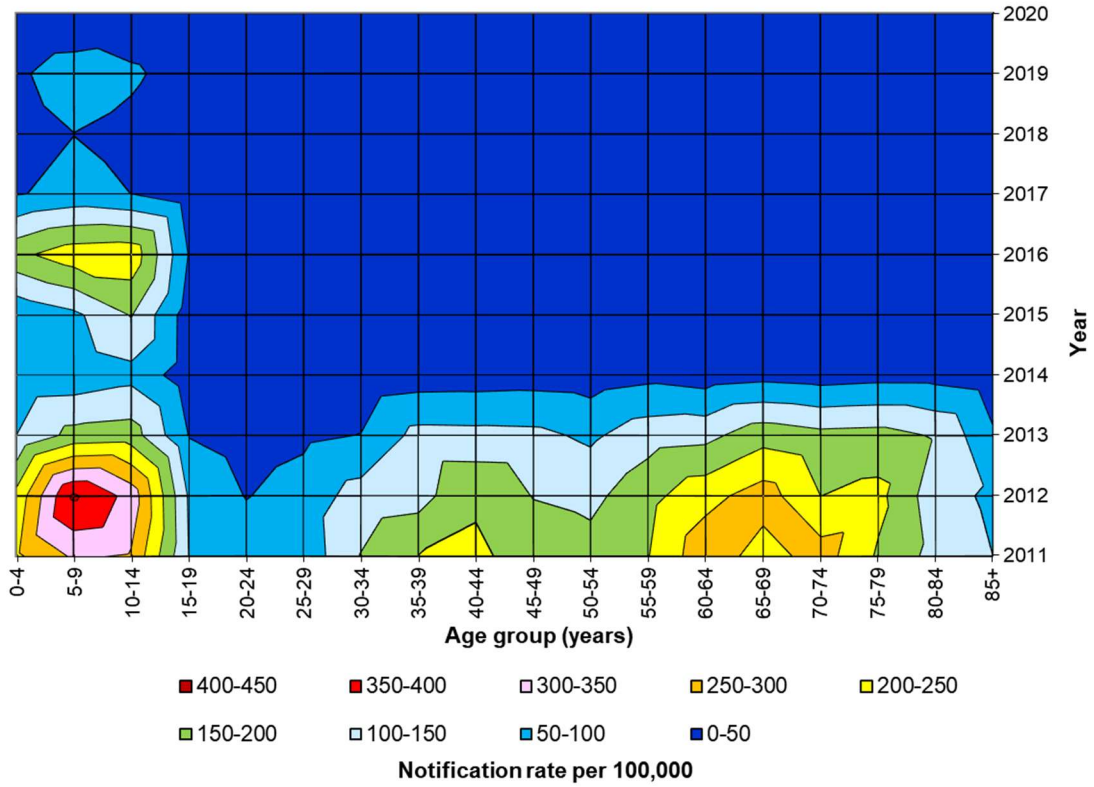


Figure 6: Pertussis age specific notification rates in Metro South Health, 2011 to 2020
(increasing age from left to right along horizontal axis; passage of time from bottom to top along vertical axis; contour colour coding depicts notification rates per 100,000 population)

The relative age group distributions of notifications for each two-year period between 2011 and 2020 are illustrated in Figures 7 and 8. In the years prior to the epidemic (pre-2010) notifications in under ten year olds comprised less than 10% of the total (data not shown), however throughout the epidemic years 2010 to 2012, the percentage in this age group increased to around 20% of all notifications (Figure 7). The proportion of notifications in this age group increased further, remaining between 30 and 40% from 2015 to 2020 despite the epidemic being over.

Detailed data analysis indicate that this increase was most noticeable among five to nine year olds (data not illustrated). The proportion of notifications in the ten to 19 years age group also increased substantially from around 20% in 20011 to 2014 to over 30% in 2015 to 2020 (Figure 7). Increases in proportionate notifications in younger age groups were mirrored by decreases in the age groups at 40 years and over (Figure 7). Trends observed in MSH were similar to trends in the rest of Queensland (data not shown).

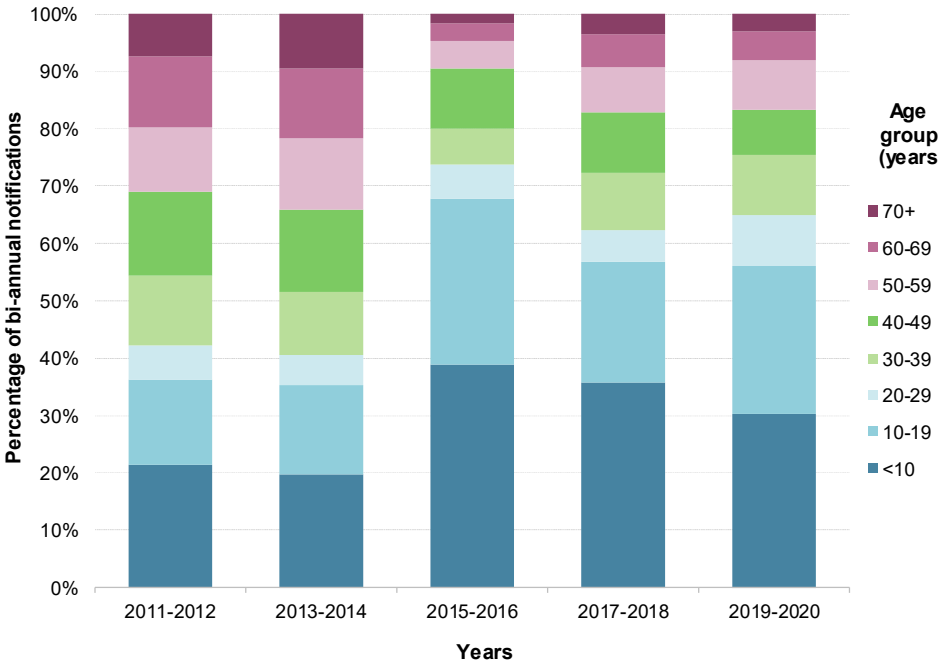


Figure 7: Pertussis biannual notification proportions, by age group, Metro South Health, 2011 to 2020

Of all children from birth to four years old diagnosed with pertussis, the proportion of infants aged less than one year decreased from 36% in 2009-10 to 22% in 2019-20 (Figure 8). Correspondingly, the proportion of three and four year olds increased from 33% in 2009-10 to 51% in 2017-18 (Figure 8), although it dropped substantially in 2019-2020 to 28%.

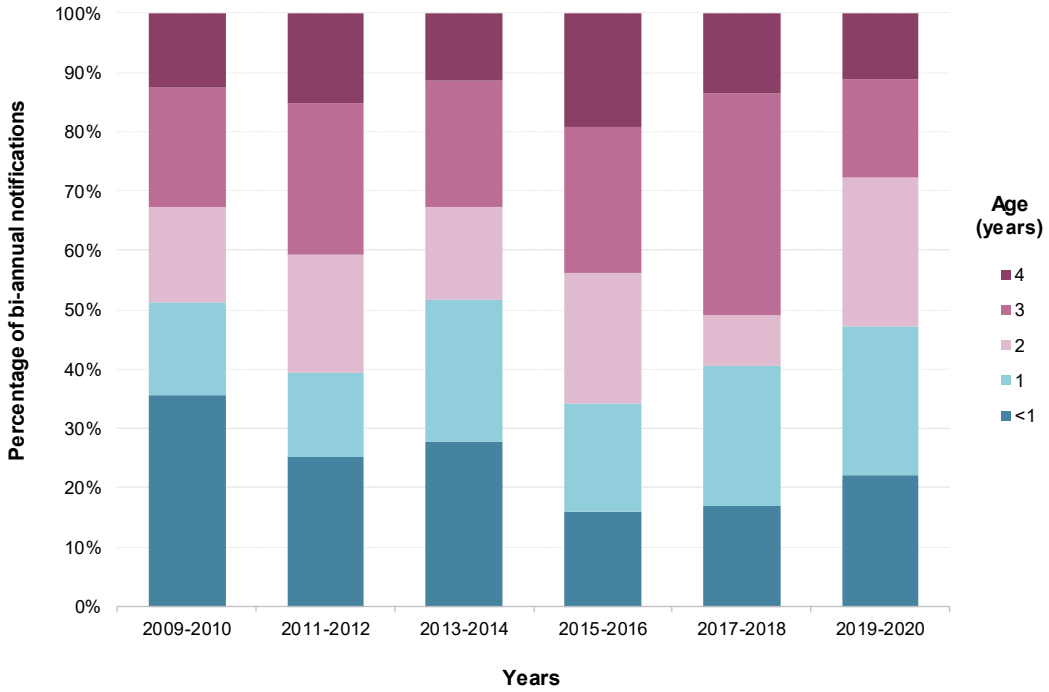


Figure 8: Pertussis biannual notification proportions, birth to 4 years group, Metro South Health, 2009 to 2020

Impact of COVID-19 pandemic

MSH counts and age standardised notification rates of pertussis dropped substantially, by almost 80% in 2020. It is likely that this reduction is the result of the COVID-19 pandemic which caused both reduced transmission owing to lockdowns and social distancing and reduced testing for pathogens other than COVID-19.

Influenza

Key findings 2018 to 2020:

- average of 6,710 influenza notifications per year among MSH residents
- age standardised notification rate for influenza in MSH of 568 cases per 100,000 population per year, significantly lower than the rate in the rest of Queensland
- age specific rates significantly higher in MSH than in the rest of Queensland for those aged 70 years and over; significantly lower in MSH than in the rest of Queensland for those aged under ten and 20 to 39 years
- influenza seasons with extremely high numbers of notifications occurred in 2017 and 2019
- 2019 season characterised by low clinical severity of disease
- an unusually low-level influenza season occurred in 2018 in comparison with the previous four years
- influenza notifications crashed to effectively nil from April 2020 onwards in response to infection and border control measures implemented in response to the COVID-19 pandemic

Influenza or 'the flu' is a highly contagious disease caused by infection from influenza type A or B (or rarely C) virus. These viruses infect the upper airways and lungs, as well as other parts of the body. Flu is not the same as a common cold and can be a serious illness especially for certain at-risk groups such as the elderly, pregnant women and those with underlying medical conditions.

Outbreaks of influenza typically occur between May and September, particularly in closely confined settings, residential care facilities, schools and workplaces as well as across the community. Public health action for influenza includes prevention through annual vaccination, minimising spread through isolation (including staying home), respiratory etiquette and hand hygiene, as well as appropriate use of antiviral medications for early treatment and possible prophylaxis in selected situations[12,13].

On average there were 6,710 influenza notifications per year among MSH residents during the period 2018 to 2020. The age standardised rate for influenza in MSH was 568 per 100,000 population, which was significantly lower than the rate in rest of Queensland (596 per 100,000).

In comparison with the rest of Queensland, age specific notification rates were significantly higher in MSH for those aged 70 years and over and significantly lower in MSH for those aged under ten years and between 20 and 39 years (Appendix 1: Table 3; Figure 9).

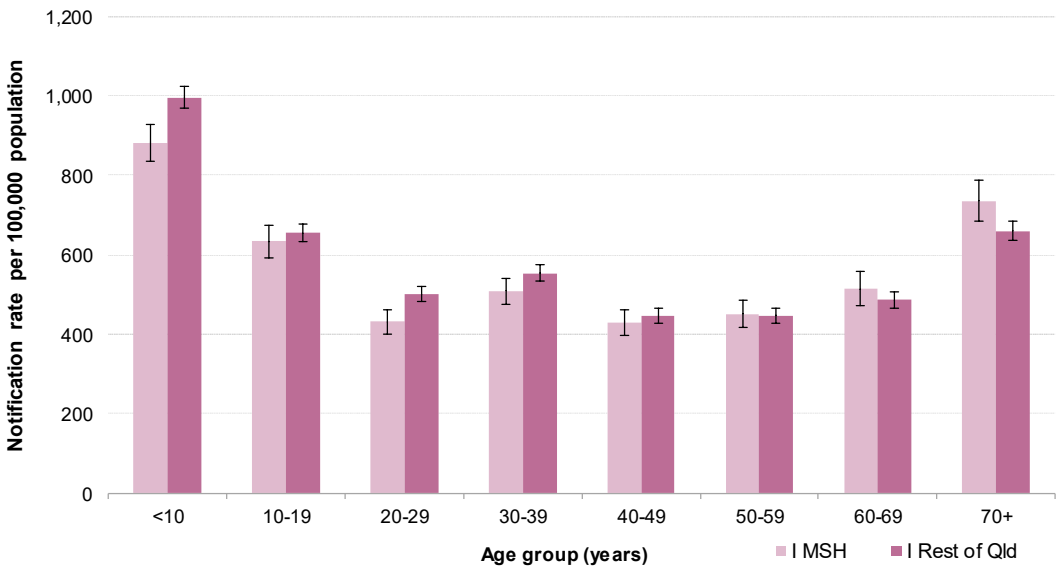


Figure 9: Influenza age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)

Across all age groups from 20 to 69 years in MSH and 20 years and over in Queensland, notification rates were significantly higher among females than males (13% higher in MSH) (Table 5). This difference may reflect higher levels of medical attendance and testing in females compared with males rather than any real difference in underlying disease incidence. In children under ten years of age the pattern was reversed, with female notification rates significantly lower than those of males in both MSH and Queensland (Table 5).

Table 5: Influenza average annual notifications and rates by sex with female to male rate ratio comparisons, Metro South Health and Queensland, 2018 to 2020

Age group (years)	Metro South Health				Queensland - All			
	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.
	Females	Males			Females	Males		
<10	635 (825.0)	757 (937.2)	0.88 (0.79 - 0.98)	↓	2,952 (926.2)	3,386 (1,010.2)	0.92 (0.87 - 0.96)	↓
10-19	459 (622.0)	500 (645.5)	0.96 (0.85 - 1.09)	—	2,058 (647.4)	2,186 (651.9)	0.99 (0.94 - 1.05)	—
20-29	458 (501.2)	334 (362.1)	1.38 (1.20 - 1.59)	↑	2,059 (577.2)	1,382 (387.7)	1.49 (1.39 - 1.59)	↑
30-39	523 (572.6)	391 (442.3)	1.29 (1.14 - 1.47)	↑	2,235 (625.4)	1,558 (455.3)	1.37 (1.29 - 1.46)	↑
40-49	387 (479.2)	295 (379.3)	1.26 (1.09 - 1.47)	↑	1,670 (489.3)	1,294 (395.9)	1.24 (1.15 - 1.33)	↑
50-59	358 (505.4)	267 (395.2)	1.28 (1.09 - 1.50)	↑	1,634 (508.5)	1,180 (385.3)	1.32 (1.23 - 1.42)	↑
60-69	321 (571.4)	236 (452.6)	1.26 (1.07 - 1.49)	↑	1,478 (548.3)	1,120 (434.8)	1.26 (1.17 - 1.36)	↑
70+	451 (776.6)	337 (687.1)	1.13 (0.98 - 1.30)	—	2,105 (719.6)	1,615 (624.7)	1.15 (1.08 - 1.23)	↑
Total	3,593 (601.9)	3,116 (533.4)	1.13 (1.07 - 1.18)	↑	16,193 (631.3)	13,723 (545.2)	1.16 (1.13 - 1.18)	↑

* ↑ Females statistically significantly higher than males; ↓ Females statistically significantly lower than males;
— no statistically significant difference between females and males; # Not calculated because age group count fewer than 5
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Very substantial peaks in influenza notifications were recorded in 2017 (over 13,000 MSH notifications) and 2019 (over 15,000 MSH notifications) (Figure 10). Prior to this peaks which were the highest recorded to that time were seen in 2014, 2015 and 2016 with over 4,000 notifications in MSH in each of these years.

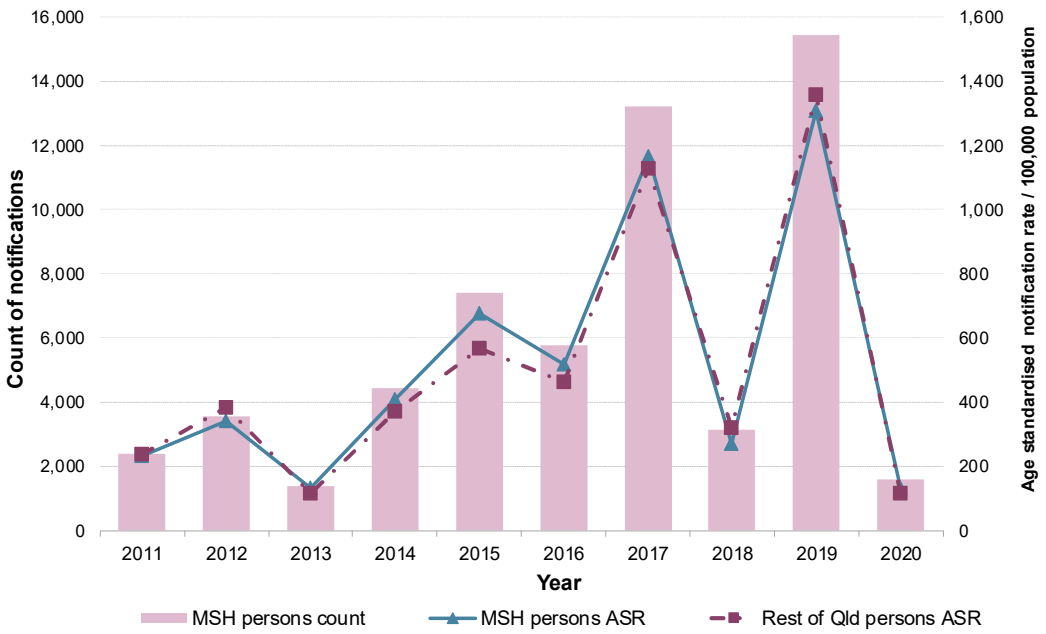


Figure 10: Influenza notification counts (Metro South Health) and age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

Detailed analysis shows the 2017 season started slightly earlier and had a more prolonged seasonal peak in comparison with preceding years (Figure 11). The 2018 season did not show a true seasonal peak and notifications also never dropped to the usual seasonal lows seen in November to February. This failure to return to very low levels of virus circulating in the community through the hotter months may have contributed to the extremely high 2019 season which started very early and was unusually broad, with weekly counts of over 600 notifications for over three months. The major peaks in 2017 and 2019 may be at least partly attributable to an increased volume of testing, including the introduction and increased use of rapid influenza testing in several hospital facilities in Queensland.

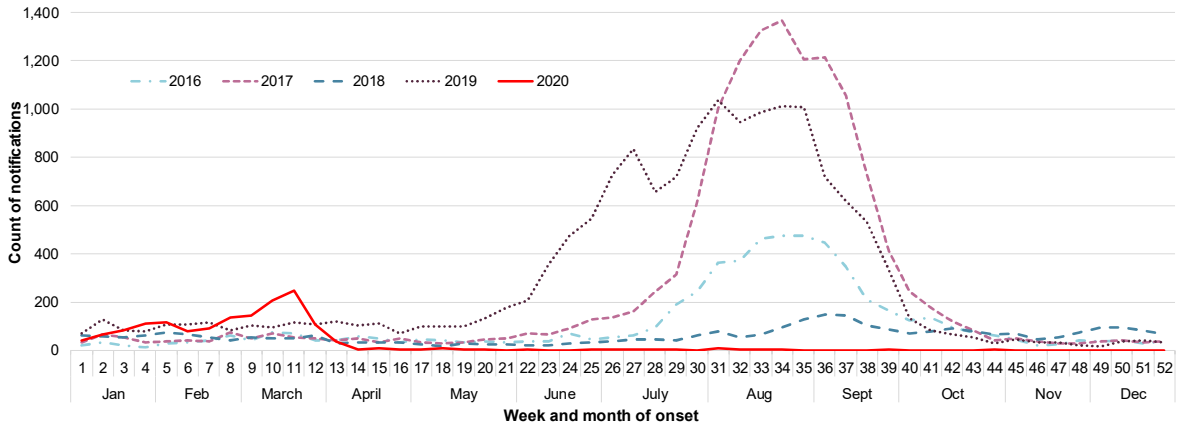


Figure 11: Influenza notification counts, Metro South Health, by ISO week of onset, 2016 to 2020

In 2009 Australia experienced the H1N1 influenza pandemic. At the time, the number of cases was the highest recorded in Queensland. However, in each year from 2014 to 2017 and 2019, the number of laboratory confirmed cases in MSH exceeded the 2009 total. While there is no doubt that 2017 was a severe flu season in terms of pure numbers, none of these five years (2014 to 2017 and 2019) would be

considered to exceed the pandemic H1N1 influenza season in overall disease severity as determined by hospitalisation rates and deaths.

One possible reason for the increase in cases after 2009 is a combination of increased testing and improvements in molecular testing. Polymerase chain reaction (PCR) testing became much more widely used after the H1N1 pandemic and the improved real-time PCR test was introduced. From 2017 onwards GeneXpert rapid PCR testing has been widely utilised in Queensland hospitals. Other hypotheses include an increase in international travel and changes to aspects of the nature of the virus. The dynamics of influenza during any season are complex and the disease burden is influenced by numerous factors including population immunity and age structure, vaccine efficacy and weather. Further examination of these factors is beyond the scope of this report.

Meaningful time series comparison may be difficult to achieve because of substantial changes and improvements in the testing environment over the period of interest, along with the complex nature of influenza during any one season. Future research in this area may provide additional evidence to support various hypotheses.

2017 and 2018 influenza seasons in Queensland:

The 2017 influenza season in Queensland signalled that at-risk populations with the highest age specific rates were those 80 years and older, followed by children under ten years of age. The 2017 season featured a significant number of outbreaks in residential age care facilities, reinforcing the importance of actively promoting annual influenza vaccination for age care residents and staff, including volunteers.

National Immunisation Program influenza vaccines are currently funded for people aged 65 years and over, Aboriginal and Torres Strait Islander peoples over six months of age, pregnant women and individuals aged six months and over with medical conditions that can lead to severe influenza. From 2018, the Queensland Government offered free influenza vaccines for children aged six months to less than five years of age; and targeted people aged 65 years for trivalent vaccines that were specifically designed to produce a higher immune response and increase protection (especially against influenza A/H3N2 which is more common and severe in the elderly)[5].

Cumulative 2018 influenza notifications for MSH and in the rest of Queensland were well below seasonal expectations from the previous three years from 2015 to 2017 (Figure 10; Figure 11). The 2018 season passed without recording any particular peak in notifications, however through November and December counts of interseasonal notifications were above average (Figure 11). Given the number of potential confounding factors including targeted vaccination programs, it is impossible to establish any direct reason or reasons for the low number of notifications in 2018.

2019 and 2020 influenza seasons in Queensland

In 2019 influenza notifications were unusually high in the interseasonal period from January to May. In all but three weeks between January and July (inclusive) the number of weekly notifications in MSH exceeded the 2015-18 seasonal average by more than two standard deviations (data not shown). The influenza season 'proper', signalled by a sharp increase in notifications, commenced earlier than usual in early June (Figure 11).

The weekly counts of notifications did not reach the extreme peaks seen in 2017, however they were the second highest on record and they persisted throughout the whole of June to September (Figure 11). While notifications were very high, the hospitalised percentage remained low throughout the season at 4.5% (compared with 9% in the low 2018 season and 11% in the peak 2017 season), indicating that clinical severity was low in 2019.

Following the major outbreak in the winter/early spring months of 2019, notifications in the interseasonal months of November 2019 to January 2020 fell to the very low numbers usually seen at this time of year (Figure 11). The 2020 season showed signs of starting very early with weekly notifications in the four weeks from late February to late March 2020 more than two standard deviations above the 2016-19 seasonal average. However, with lockdowns and social distancing implemented from late March in response to the COVID-19 pandemic, weekly influenza notifications dropped to and remained at essentially zero for the remainder of 2020 (Figure 11).

Impact of COVID-19 pandemic

MSH notification counts of influenza dropped to essentially zero from late March 2020. It is almost certain that this crash in influenza is the result of the COVID-19 pandemic which caused reduced transmission owing to lock down, improved personal hygiene, social distancing, reduced testing for pathogens other than COVID-19 and close to elimination of importation of influenza via overseas travel.

Given that influenza infections remain extremely low in 2021, it is likely that this situation will continue until international borders are opened and 14-day quarantine for return travellers is wound back.

Pneumococcal disease

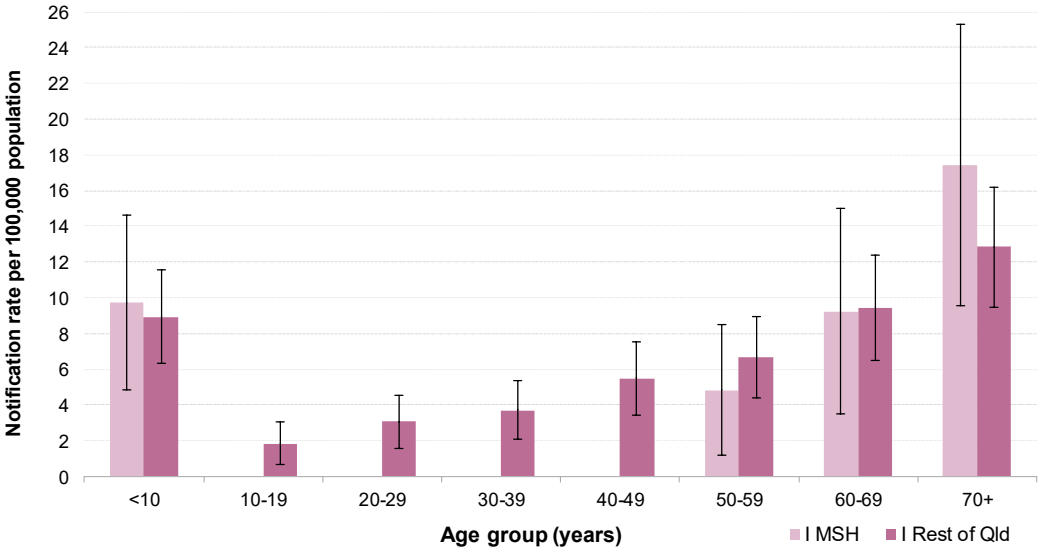
Key findings 2018 to 2020:

- average of 67 pneumococcal disease notifications per year among MSH residents
- age standardised notification rate for pneumococcal disease in MSH of 5.5 per 100,000 population statistically similar to rate in the rest of Queensland
- age specific rates in MSH similar to the rest of Queensland
- increase in cases recorded between 2015 and 2019 with 2018 having the highest numbers in the last ten years
- large drop in cases in 2020 likely largely attributable to the impact of the COVID-19 pandemic

Pneumococcal disease is caused by the bacterium *Streptococcus pneumoniae* (also known as pneumococcus), commonly carried in the nose and throat, often without causing any health problems. It is easily spread from person to person by coughing or sneezing or contact with mucous from the nose and throat. Some strains can cause meningitis, septicaemia and pneumonia ("invasive pneumococcal disease", IPD) particularly in children aged less than two years as well as people aged over 65 years and Aboriginal and Torres Strait Islander people. Public health action for pneumococcal disease includes vaccination for children and the elderly, as well as for people with medical risk factors which makes them more vulnerable[12].

On average there were 67 notifications of pneumococcal disease per year among MSH residents during 2018 to 2020. The age standardised rate for pneumococcal disease in MSH was 5.5 per 100,000 population, which was statistically similar to the rate for the rest of Queensland (6.0 per 100,000).

Age specific rates across ten-year age groups were similar in MSH when compared with the rest of Queensland where numbers of notifications were sufficient for reliable rates to be calculated (Appendix 1: Table 4). Notification rates were relatively high in children under ten years of age, then decreased to a minimum level in the 10 to 19 years age group after which they increased with each age group increment to a peak in the 70 years and over age group (Figure 12).



* rates not presented for age groups 10 to 49 years for MSH because of low or zero counts

Figure 12: Pneumococcal disease age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)*

The lowest rate and annual number of confirmed pneumococcal disease cases in MSH in the last ten years was recorded in 2015 (84 cases) (Figure 13). Following this low, rates and counts increased substantially with 2018 seeing the highest number of cases recorded since 2012 (Figure 13). The cause of this increase is unclear. Following the peak years of 2018 and 2019, in 2020 a drop to rates and counts to a level lower than seen in 2015 was observed (Figure 13).

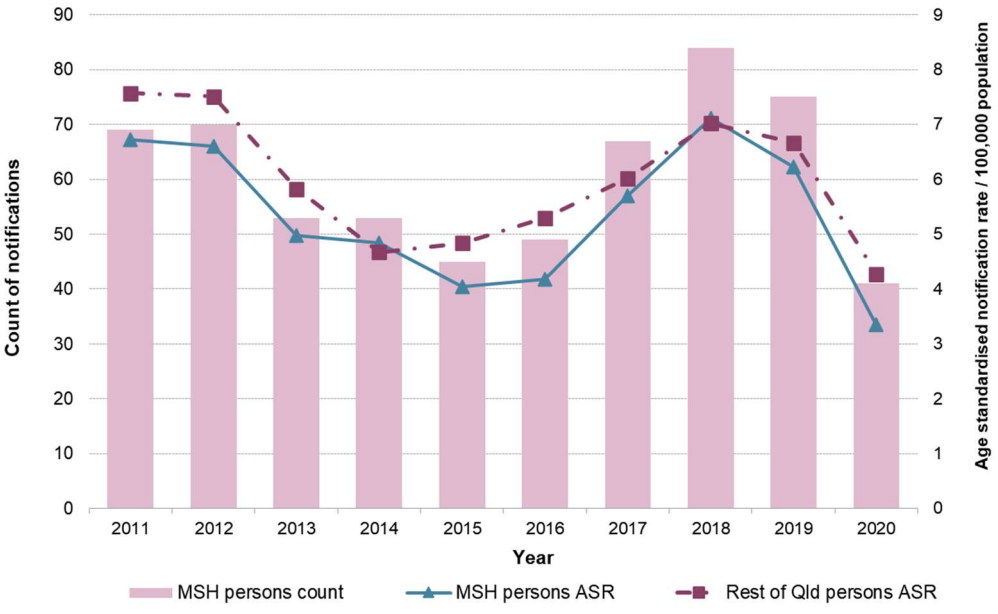


Figure 13: Pneumococcal disease notification counts (Metro South Health) and age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

Impact of COVID-19 pandemic

MSH notification counts and rates of pneumococcal disease dropped to the lowest level seen in the last ten years in 2020. This drop is most likely largely attributable to the impact of the COVID-19 pandemic which caused reduced transmission owing to lock down and social distancing and reduced testing for pathogens other than COVID-19.

Varicella

Key findings 2018 to 2020:

- average of 2,460 varicella notifications per year among MSH residents
- age standardised notification rate for varicella in MSH of 204 per 100,000 population significantly higher than the rate in the rest of Queensland
- age specific rates significantly higher in MSH than in the rest of Queensland for those aged under 10 and 50 to 69 years
- notification counts more than doubled from just over 1,100 in 2011 to over 2,550 in 2020
- no evidence of any impact from COVID-19 pandemic

The Varicella zoster virus causes both chickenpox and shingles. Varicella is a relatively mild disease in children but can be a more severe illness in adults, immunosuppressed individuals and during pregnancy. Following recovery from chickenpox, the virus does not disappear from the body, but stays dormant in the nerves of the spine from where it can reappear in the form of shingles as the person gets older.

Chickenpox is spread through coughing, sneezing and direct contact with the fluid in the blisters of the rash. The dry scabs are not infectious. Since shingles blisters also contain the virus, a person who has never had chickenpox can become infected with chickenpox from someone who has shingles[12].

Public health action for varicella includes funded vaccination (children, elderly) and use of specific immunoglobulin (passive immunisation) for selected high risk contacts[12]. The National Immunisation Program (NIP) provides a combined measles, mumps, rubella and varicella (MMRV) to all children aged 18 months. Under the NIP, varicella vaccine catch-up is funded for all individuals under 20 years of age with no documented history of previous varicella vaccine.

On average there were 2,460 notifications of varicella per year among MSH residents during the period 2018 to 2020. The age standardised notification rate for varicella in MSH was 204 per 100,000 population, which was significantly higher (15% higher) than the rate for the rest of Queensland (178 per 100,000). Age specific rates were significantly higher in MSH than in the rest of Queensland for those in the ten-year age groups under 10 years and between 50 and 69 years (Appendix 1: Table 5).

In MSH notification rates showed a peak in the five to 14 years age groups before falling to lower levels among people aged 15 to 24 years. Rates then increase fairly steadily with each incremental five-year age group, peaking in persons aged 65 to 69 years (Figure 14).

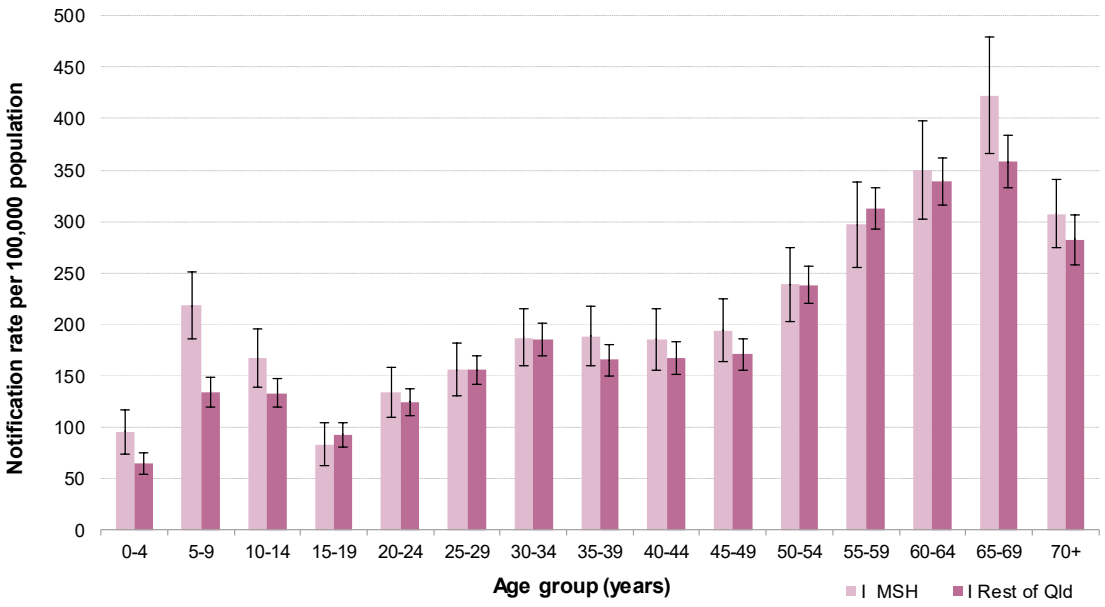


Figure 14: Varicella age specific rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)

Overall, across MSH and Queensland, varicella notification rates were significantly higher (12% higher in MSH) in females than in males (Table 6). In both MSH and Queensland, rates were significantly higher in females than males in all age groups over 50 years. There were no significant differences between the sexes in younger age groups (Table 6).

Table 6: Varicella average annual notifications and rates by sex with female to male rate ratio comparisons, Metro South Health and Queensland, 2018 to 2020**

Age group (years)	Metro South Health				Queensland - All			
	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male	Signif. diff.	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male	Signif. diff.
	Females	Males	(95% Conf. Int.)		Females	Males	(95% Conf. Int.)	
<10	113 (147.2)	135 (167.6)	0.88 (0.68 - 1.13)	—	357 (112.1)	422 (125.8)	0.89 (0.77 - 1.03)	—
10-19	85 (114.8)	106 (136.9)	0.84 (0.63 - 1.12)	—	362 (113.8)	390 (116.4)	0.98 (0.85 - 1.13)	—
20-29	134 (146.9)	133 (144.2)	1.02 (0.80 - 1.29)	—	508 (142.5)	460 (129.1)	1.10 (0.97 - 1.25)	—
30-39	176 (193.1)	161 (182.7)	1.06 (0.85 - 1.31)	—	643 (179.8)	563 (164.6)	1.09 (0.98 - 1.22)	—
40-49	158 (195.5)	143 (183.6)	1.06 (0.85 - 1.33)	—	599 (175.5)	556 (170.1)	1.03 (0.92 - 1.16)	—
50-59	212 (299.0)	158 (234.2)	1.28 (1.04 - 1.57)	↑	903 (281.1)	619 (202.1)	1.39 (1.26 - 1.54)	↑
60-69	243 (433.0)	172 (329.9)	1.31 (1.08 - 1.59)	↑	986 (365.7)	762 (295.6)	1.24 (1.13 - 1.36)	↑
70+	198 (341.3)	132 (268.2)	1.27 (1.02 - 1.58)	↑	955 (326.4)	714 (276.1)	1.18 (1.07 - 1.30)	↑
Total	1,320 (215.8)	1,140 (192.5)	1.12 (1.04 - 1.21)	↑	5,313 (196.7)	4,486 (170.6)	1.15 (1.11 - 1.20)	↑

* ↑ Females statistically significantly higher than males; ↓ Females statistically significantly lower than males;
— no statistically significant difference between females and males; # Not calculated because age group count fewer than 5
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Reliable notifications data for varicella have been collected since 2006. Between 2009 and 2012 (some data not shown) both age standardised notification rates and total counts were relatively steady but from 2012 to 2018 rates and counts increased steadily almost every year (Figure 15). Over the ten-year reporting period, counts of notifications in MSH more than doubled from just over 1,100 per year in 2011 to over 2,550 per year in 2020 (Figure 15).

Figure 15: Varicella notification counts (Metro South Health) and age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

Impact of COVID-19 pandemic

MSH notification counts and rates of varicella pneumococcal disease increased in 2020, continuing a pattern fairly consistent over the past ten years. There is no evidence that the COVID-19 pandemic impacted on varicella notifications in MSH, despite impacting on the incidence and rates other vaccine preventable diseases.

Gastro-Enteric Diseases

Overview

- Gastrointestinal infection or gastroenteritis (often called ‘gastro’) is infection that occurs when a microorganism or its toxic product affects the gastrointestinal tract (stomach and intestines) causing illness such diarrhoea, vomiting and/or stomach cramps. Gastroenteritis can cause dehydration resulting in a loss of fluids that the body needs to work normally.
- Viruses (such as rotavirus or norovirus) are the most common cause of gastro. As there are many kinds of viruses, gastroenteritis can occur more than once in an individual.
- Bacteria (such as *Campylobacter*, *Salmonella* and *Shigella*), parasites (such as *Giardia* and *Cryptosporidium*) and food poisoning can also cause gastro.
- Gastro-enteric diseases are most commonly spread through contaminated food or water, or from person to person (faecal-oral spread being most common), often because of poor hygiene (such as not washing hands after going to the toilet). Less commonly, gastro can be spread through handling pets and animals (such as a visit to a petting zoo or farm).
- Public health actions to reduce and/or stop the spread of gastro include:
    - good personal hygiene practices (such as hand washing)
    - food safety practices (safe food handling, preparation and storage)
    - prevention through immunisation (for rotavirus)
    - minimising spread to others through isolation (such as not returning to work until symptoms have ceased for 24–48 hours – especially for those who work in the food or health care industries)
    - cohort-nursing
    - personal protection measures
    - appropriate cleaning of fomites
- Super-chlorination (also known as hyperchlorination) of swimming pools (for cryptosporidiosis) is another public health action facilitated through multi-disciplinary outbreak control teams that aims to identify and remove the source and minimise spread

Salmonellosis

Key findings 2018 to 2020:

- average of 737 *Salmonella* notifications per year among MSH residents
- age standardised rate in MSH 62 per 100,000, significantly lower than rest of Queensland
- notification rates peak in children aged under five years of age
- no evidence of any impact from COVID-19 pandemic

Salmonella infection (salmonellosis) is a type of gastroenteritis caused by *Salmonella* bacteria. In Australia, most *Salmonella* infections occur after eating contaminated food but also sometimes after contact with another person with the infection. Salmonellosis can affect all ages; however, most cases occur in young children.

There were 737 notifications of salmonellosis on average per year among MSH residents during 2018 to 2020. The age standardised rate for salmonellosis in MSH was 62 per 100,000 population, which was significantly lower than the rate in the rest of Queensland (79 per 100,000).

Age specific notification rates were statistically similar in MSH and the rest of Queensland for all ten-year age groups except those aged under ten years and 50 to 59 years where rates were significantly lower in MSH (Appendix 1: Table 6).

Notification rates were highest among children under five years of age, with the rate in this age group approximately four to six times higher than rates in older age groups. Rates were relatively constant across all age groups over four years of age (Figure 16) apart from a small increase in persons 60 years and over. Higher rates among young children could, at least in part, reflect a lower threshold for testing in this age group.

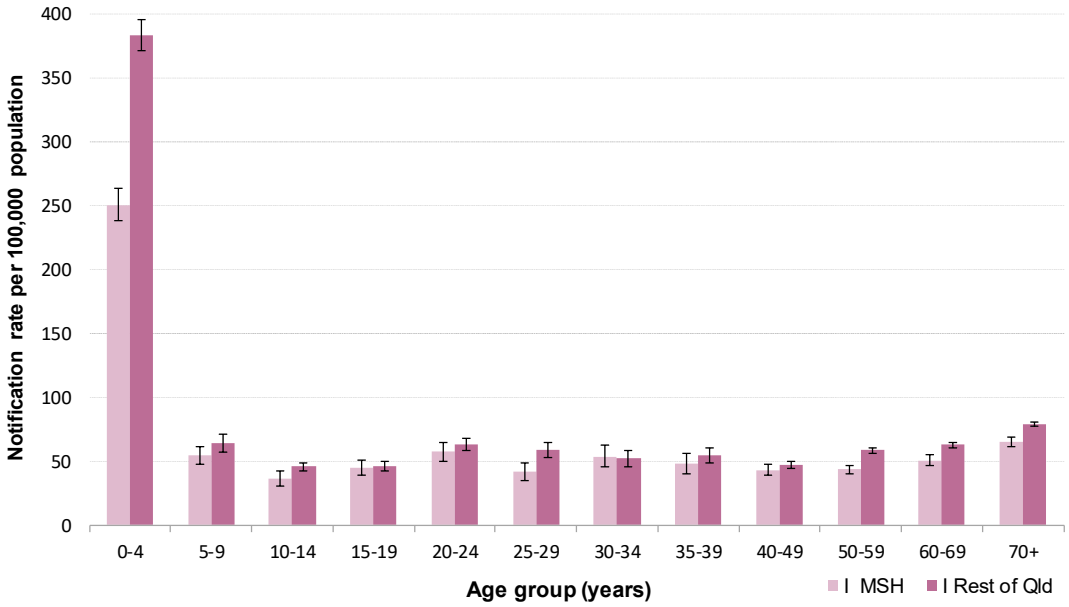


Figure 16: Salmonellosis age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)

There was no significant difference in overall notification rate between males and females in MSH or across Queensland (Table 7). When broken down by age group, rates in Queensland were significantly higher in females than males in the 20 to 39 years age groups.

Table 7: Salmonellosis average annual notifications and rates by sex with female to male rate ratio comparisons, Metro South Health and Queensland, 2018 to 2020**

Age group (years)	Metro South Health				Queensland - All			
	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male	Signif. diff.	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male	Signif. diff.
	Females	Males	(95% Conf. Int.)		Females	Males	(95% Conf. Int.)	
<10	114 (147.6)	125 (154.8)	0.95 (0.74 - 1.23)	—	615 (193.1)	699 (208.5)	0.93 (0.83 - 1.03)	—
10-19	28 (37.5)	34 (43.9)	0.85 (0.52 - 1.41)	—	144 (45.4)	148 (44.1)	1.03 (0.82 - 1.29)	—
20-29	52 (56.9)	39 (42.3)	1.34 (0.89 - 2.03)	—	233 (65.2)	181 (50.7)	1.29 (1.06 - 1.56)	↑
30-39	53 (58.4)	39 (43.8)	1.33 (0.88 - 2.01)	—	209 (58.5)	161 (46.9)	1.25 (1.01 - 1.53)	↑
40-49	38 (47.4)	30 (39.0)	1.22 (0.76 - 1.96)	—	171 (50.0)	141 (43.0)	1.16 (0.93 - 1.45)	—
50-59	33 (47.0)	27 (40.0)	1.17 (0.71 - 1.95)	—	191 (59.4)	156 (50.8)	1.17 (0.95 - 1.44)	—
60-69	32 (57.6)	23 (43.5)	1.33 (0.78 - 2.26)	—	176 (65.2)	142 (55.2)	1.18 (0.95 - 1.47)	—
70+	36 (61.9)	34 (69.3)	0.89 (0.56 - 1.43)	—	219 (74.8)	202 (78.0)	0.96 (0.79 - 1.16)	—
Total	387 (64.3)	351 (59.8)	1.07 (0.93 - 1.24)	—	1,957 (76.6)	1,828 (72.7)	1.05 (0.98 - 1.13)	—

* ↑ Females statistically significantly higher than males; ↓ Females statistically significantly lower than males;
— no statistically significant difference between females and males; # Not calculated because age group count fewer than 5
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

In 2014 and 2015 both MSH and the rest of Queensland experienced major increases in salmonellosis notification rates (Figure 17). Prior to 2014, notification rates in MSH were consistently lower than in the rest of Queensland. In most years prior to 2014 (some data not shown) MSH recorded fewer than 600 notifications per year, however in 2014 this rose to over 1,100 with over 1,300 recorded in 2015 (Figure 17). The increase observed in MSH was proportionally greater than the increase in the rest of Queensland.

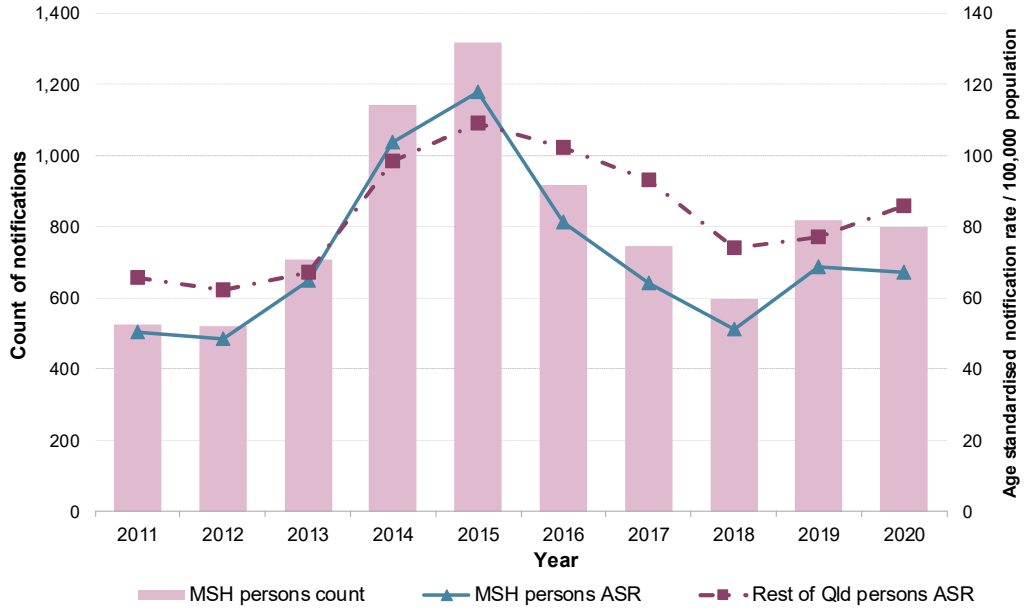


Figure 17: Salmonellosis notification counts (Metro South Health) and age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

In the summer of 2014/15 MSPHU investigated numerous outbreaks of *Salmonella* linked with contaminated egg products. Some of these outbreaks involved high case numbers and had consequent hospitalisations. Outbreak investigation data indicate that the number of outbreaks fell following the summer of 2014/15, and the MSH notification counts (and rates) showed a corresponding drop in 2016 and a further drop to 2018 (Figure 17).

Impact of COVID-19 pandemic

MSH counts and age standardised notification rates of salmonellosis in 2020 were similar to those recorded in 2019. The COVID-19 pandemic does not appear to have had any appreciable impact on salmonellosis in MSH

Campylobacter

Key findings 2018 to 2020:

- average of 1,869 notifications per year among MSH residents
- age standardised notification rate in MSH of 157 per 100,000, statistically similar to the rest of Queensland rate
- notification rates highest among children from birth to four years of age
- substantial increase in notification rates across Queensland in 2014 to 2020 with the occurrence of a recognised state-wide outbreak, largely during the warmer months
- no definite evidence of impact from COVID-19 pandemic

Campylobacter infection (also known as campylobacteriosis) is a gastrointestinal disease caused by bacteria called *Campylobacter. Campylobacter* can affect all age groups, although very young children and the elderly, people with poor immunity and people who work with farm animals are at greater risk of infection. Infection can occur at any time of the year but is more common in the warmer months.

On average there were 1,869 notifications of *Campylobacter* per year among MSH residents during 2018 to 20208. The age standardised notification rate for *Campylobacter* in MSH was 157 per 100,000 population, which was statistically similar to the rate in the rest of Queensland of 164 per 100,000.

The age specific notification rate for *Campylobacter* was significantly lower in MSH than the rest of Queensland for those aged 20 to 29 years (Appendix 1: Table 7). There were no statistically significant differences in any other ten-year age groups (Appendix 1: Table 7). Notification rates were highest among children from birth to four years of age. Rates then dropped significantly in children aged five to 14 years before increasing again in adult age groups (Figure 18).

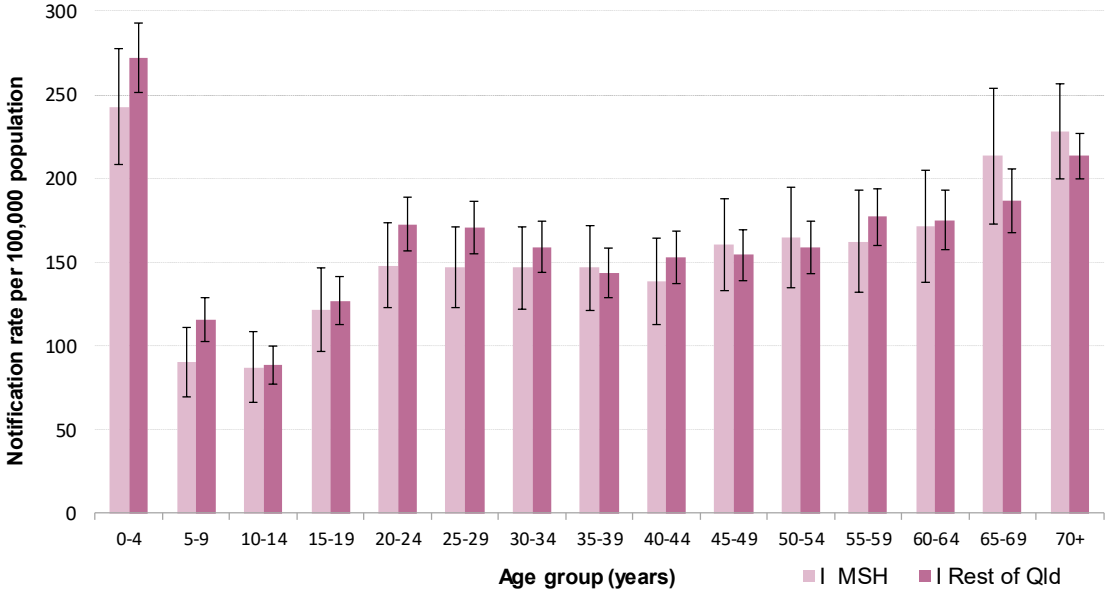


Figure 18: *Campylobacter* age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)

Overall, across MSH and Queensland, *Campylobacter* notification rates were significantly lower (14% lower in MSH) in females than in males (Table 8). In Queensland, female rates were significantly lower than male rates for all ten-year age groups except those between 20 and 39 years.

Table 8: *Campylobacter* average annual notifications and rates by sex with female to male rate ratio comparisons, Metro South Health and Queensland, 2018 to 2020**

Age group (years)	Metro South Health				Queensland - All			
	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.
	Females	Males			Females	Males		
<10	112 (145.9)	149 (184.6)	0.79 (0.62 - 1.01)	—	493 (154.6)	713 (212.8)	0.73 (0.65 - 0.81)	🡻
10-19	65 (88.2)	92 (119.3)	0.74 (0.54 - 1.01)	—	284 (89.3)	411 (122.6)	0.73 (0.63 - 0.85)	🡻
20-29	135 (147.6)	136 (147.4)	1.00 (0.79 - 1.27)	—	575 (161.2)	605 (169.6)	0.95 (0.85 - 1.07)	—
30-39	123 (134.7)	141 (159.3)	0.85 (0.66 - 1.08)	—	510 (142.7)	542 (158.3)	0.90 (0.80 - 1.02)	—
40-49	115 (142.7)	122 (157.1)	0.91 (0.70 - 1.17)	—	475 (139.2)	545 (166.7)	0.84 (0.74 - 0.94)	🡻
50-59	103 (145.8)	123 (182.3)	0.80 (0.62 - 1.04)	—	484 (150.5)	564 (184.3)	0.82 (0.72 - 0.92)	🡻
60-69	103 (183.0)	104 (199.5)	0.92 (0.70 - 1.20)	—	442 (164.1)	521 (202.3)	0.81 (0.71 - 0.92)	🡻
70+	116 (199.6)	129 (262.1)	0.76 (0.59 - 0.98)	🡻	560 (191.4)	633 (244.7)	0.78 (0.70 - 0.88)	🡻
Total	873 (144.5)	996 (168.8)	0.86 (0.78 - 0.94)	🡻	3,823 (146.9)	4,535 (176.8)	0.83 (0.80 - 0.86)	🡻

* 🡹 Females statistically significantly higher than males; 🡻 Females statistically significantly lower than males;
— no statistically significant difference between females and males; # Not calculated because age group count fewer than 5
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Prior to 2014, notification counts and rates for *Campylobacter* in MSH were in decline for around five years from over 1,000 notifications per year in 2009 to fewer than 800 in 2013 (Figure 19), some data not shown). However, in 2014 and 2015 notifications across the state increased substantially with Queensland recognised as experiencing a statewide outbreak (Figure 19). An analysis of annual notifications by month indicated that during the outbreak (2014 to 2020) a larger proportion of cases occurred during the warmer months. For example in MSH in 2019, the five hottest months (October – February) averaged over 60 notifications more per month than the cooler months (March – September).

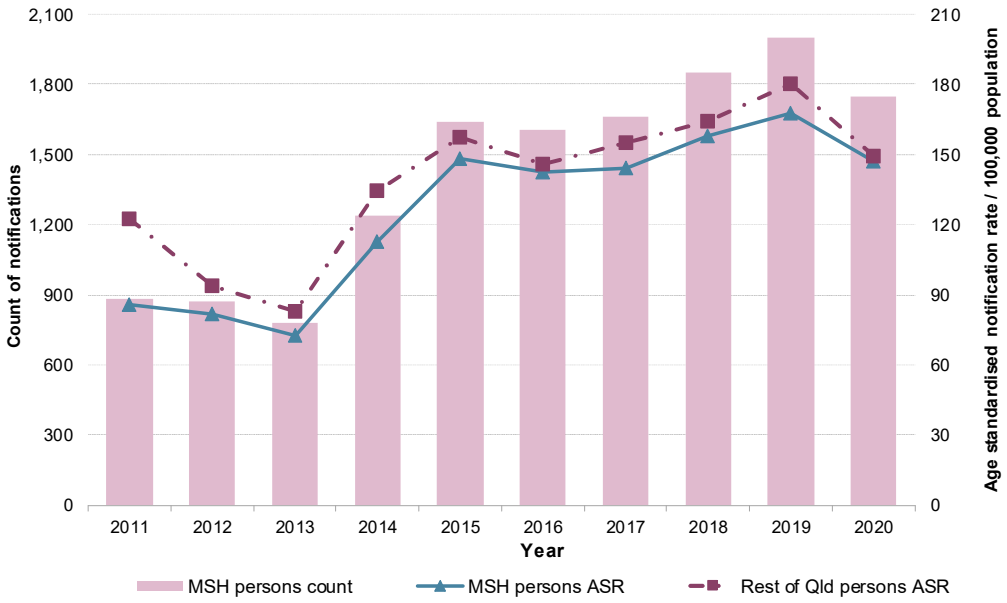


Figure 19: *Campylobacter* notification counts (Metro South Health) and age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

Between 2013 and 2015 (the early part of the outbreak), the number of *Campylobacter* notifications in MSH increased by over 100% (Figure 19), with a disproportionate amount of this increase occurring within females (data not shown). Between 2015 and 2017, notifications levelled in MSH and the rest of Queensland, however 2018 and 2019 saw further increases before a drop in 2020 (Figure 19).

Impact of COVID-19 pandemic

MSH counts and age standardised notification rates of Campylobacter dropped in 2020, however only to a level comparable with that recorded in 2017 and 2018. While this may reflect a reduction in testing and/or in people 'eating out' during the COVID pandemic, the drop was to a level not outside the boundaries of those recorded in recent years. As a result it is not possible to firmly attribute any change in Campylobacter notifications in MSH to the COVID-19 pandemic.

Rotavirus

Key findings 2018 to 2020:

- average of 280 notifications of rotavirus per year among MSH residents
- age standardised notification rate in MSH of 24 per 100,000 population significantly higher than the rate in the rest of Queensland
- Since the introduction of the rotavirus vaccine to the National Immunisation Program there has been a reduction in the proportion of cases among infants aged six to less than 12 months
- no definite evidence of impact from COVID-19 pandemic

Rotaviruses are a group of viruses that can cause severe gastroenteritis, particularly in infants and young children. The virus is highly contagious and can cause outbreaks among children in childcare.

Prevention of rotavirus is achieved by immunisation which is provided under the National Immunisation Program (NIP). Vaccines for rotavirus first became available in early 2006 and were added to the NIP from 1 July 2007. Queensland began vaccinating children in a three-dose schedule at two, four, and six months of age. From 1 July 2017 Queensland replaced the three-dose schedule with a two-dose schedule at two and four months of age.

There were 280 notifications of rotavirus on average per year among MSH residents during 2018 to 2020. The age standardised notification rate for rotavirus in MSH was 24 per 100,000 population, which was significantly higher than the rate in the rest of Queensland (20 per 100,000).

Age specific rates were statistically similar in MSH and the rest of Queensland for all age groups except those aged 70 years and over, where the rate in MSH was significantly higher than the rest of Queensland (Appendix 1: Table 8). Notification rates were very high in birth to four year olds, with rates then falling rapidly with increasing age (Figure 20). Rates rose slightly in those aged 70 years and above.

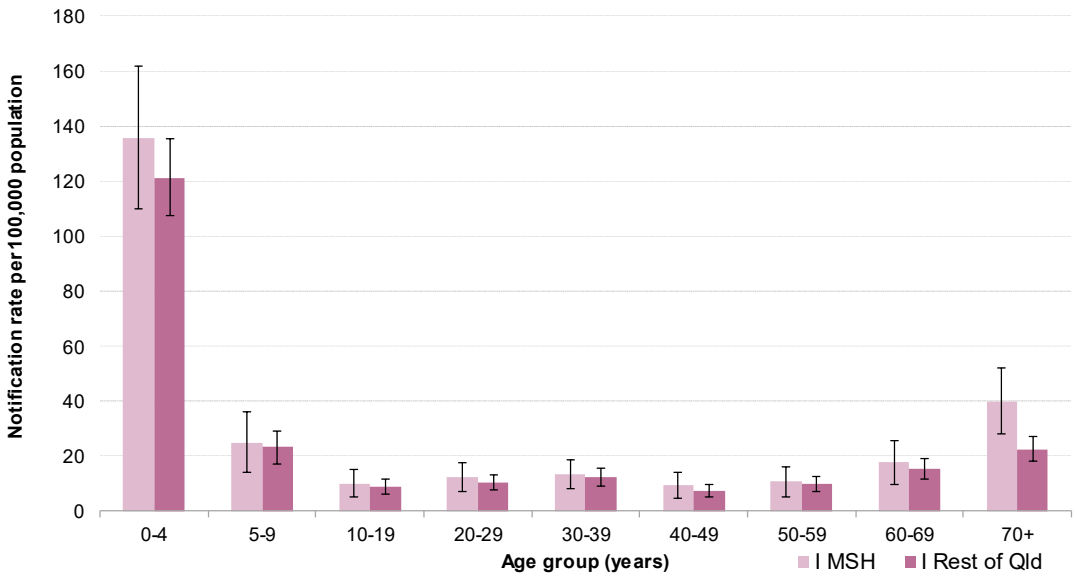


Figure 20: Rotavirus age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)

Overall, across MSH and the rest of Queensland, rotavirus notification rates were statistically similar in males and females (data not shown).

Following the introduction of the vaccine in 2007, there was a rapid decline in rotavirus notification rates. Between 2007 and 2010, rates in MSH and the rest of Queensland fell by more than half, with the most significant decline between 2007 and 2008, immediately following the introduction of the vaccine (data not shown). However, in MSH notification rates and counts gradually increased from 2010 to a substantial peak in 2017 (Figure 21). In 2016 the MSH rate was at a level comparable with that recorded pre-vaccine in 2007. Rates in the rest of Queensland also peaked in 2017.

In late 2015 two of the major Queensland pathology services introduced PCR testing for rotavirus infection as part of viral enteric pathogen panels. The current PCR testing does not discriminate between wild type rotavirus and the vaccine strains *(D Whiley Pathology Queensland, personal communication, 18 July 2017).* The introduction of this testing likely contributed to the observed increase in notifications in children under one year of age from late 2015 onwards as the vaccine strain was detected by the new test.

In 2018 rates and counts returned to levels comparable with those seen in 2009 and 2010 (data not shown), before spiking again in 2019 then dropping to an extreme low in 2020 (Figure 21). The reasons for the high level of variability in both MSH and the rest of Queensland are unclear. There was a change in the dose schedule in July 2017 but this would not be expected to cause the variability observed.

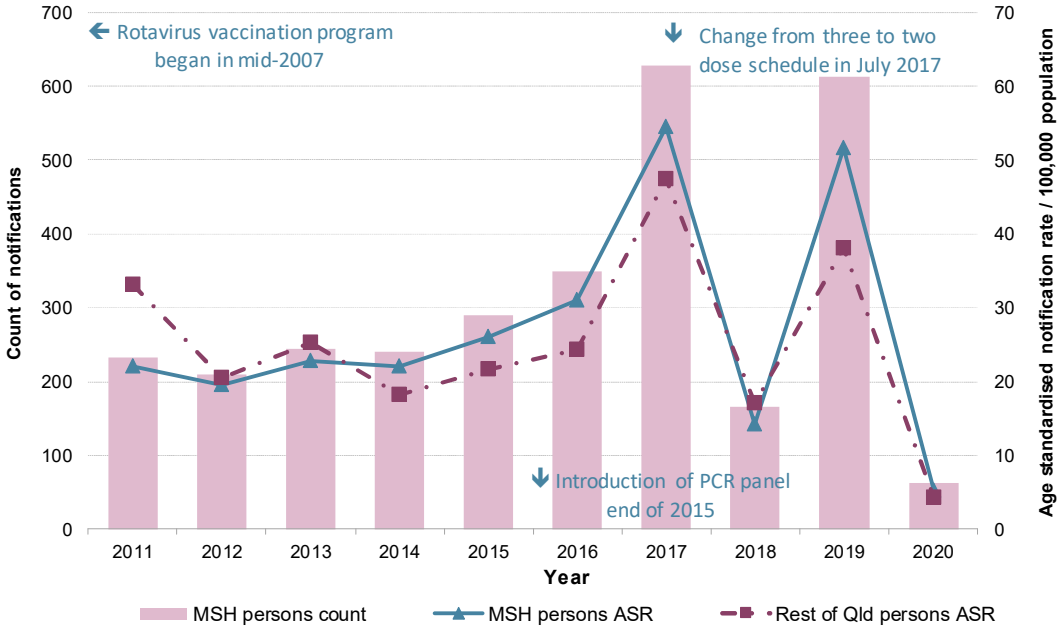


Figure 21: Rotavirus notification counts (Metro South Health) and age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

The relative age group distribution of rotavirus notifications in MSH for each two-year period from 2011 to 2020 is shown in Figure 22. The overwhelmingly high proportion of notifications in the under ten years age group showed a substantial decline (29 percentage points) over time from 67% in 2011-12 to 41% in 2017-18 and 46% in 2019-20. The proportion of notifications in each of the older ten-year age groups increased over this period. The greatest proportional increases were in those aged 30 to 39 and 70 years which both increase by more than 100%. Such substantial proportional increases in the older age groups is evidence of the efficacy of the vaccination in decreasing cases and hence notifications in young children and is also suggestive of an increase in testing in older age groups.

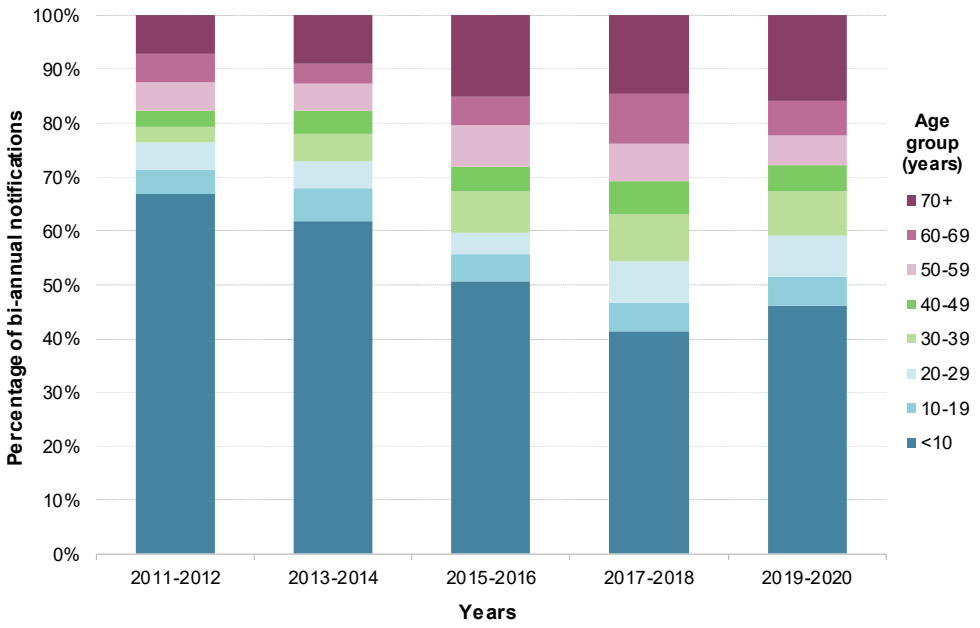


Figure 22. Rotavirus biannual notification proportions by age group, Metro South Health, 2011 to 2020

The rotavirus vaccine most commonly used in Queensland up to 1 July 2017 was routinely administered at two, four and six months of age. From 1 July 2017 the change was made to a two-dose schedule at two and four months. Based on the initial rotavirus vaccine schedule (to July 2017), it would be expected that at a population level, children aged less than six months would have nil or partial immunity while those aged six months and over and vaccinated would be protected by vaccination.

The relative age distribution of notifications in infants under the age of one year is shown in (Figure 23). In 2008-09, immediately following the 2007 introduction of the vaccine, 58% of infant notifications were in children aged six to less than 12 months (data not shown). However, by 2018, with the vaccine available in the NIP for over ten years, this had dropped to 22%. Conversely, in children aged under six months, the age group with at most partial immunity, the proportion of notifications showed a clear increase over time from 50% in 2010-11 to 76% in 2020. These substantial proportional changes (decrease in the six to less than 12 months vs. increase in under six months) are also evidence of the efficacy of the vaccine in decreasing infections once the course has been completed.

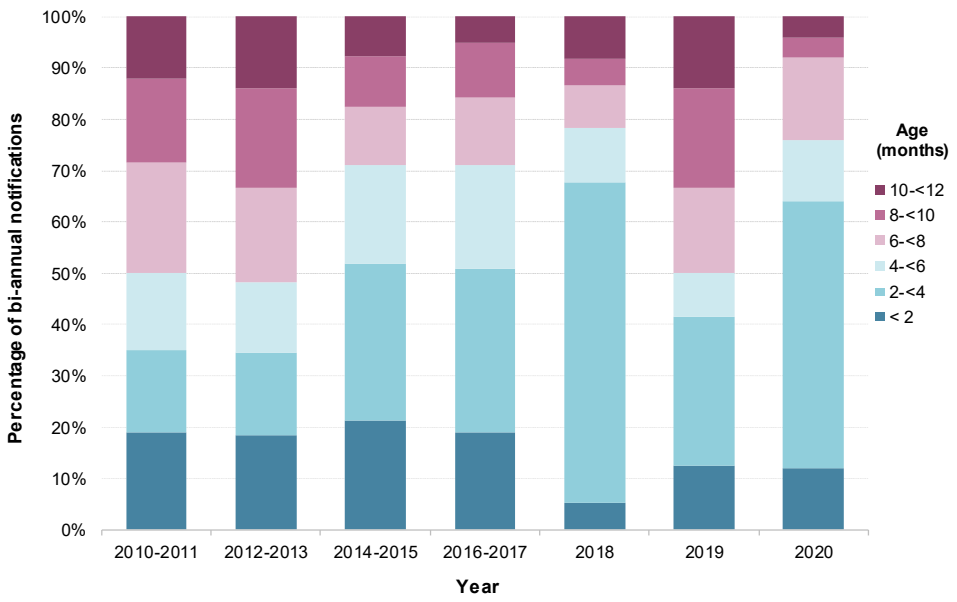


Figure 23: Rotavirus biannual notification proportions in infants by age group, Metro South Health, 2010 to 2017 and single years 2018 to 2020

Impact of COVID-19 pandemic

MSH counts and age standardised notification rates of rotavirus infections dropped substantially in 2020. It is possible that this drop was at least partly the result of a reduction in testing and/or in childcare use and people 'eating out' during the COVID pandemic. However a substantial and unexplained drop in notifications was also observed in 2018, indicating that there are likely also to have been non-COVID-19 related factors at play in the drop in 2020. As a result it is not possible to firmly attribute any change in rotavirus notifications in MSH to the COVID-19 pandemic alone.

Cryptosporidiosis

Key findings 2018 to 2020:

- average 76 notifications of cryptosporidiosis per year among MSH residents
- age standardised notification rate in MSH of 13 per 100,000 population not significantly different from the rest of Queensland rate
- notification rates highest among children from birth to four years of age
- no evidence of any impact from COVID-19 pandemic

Cryptosporidiosis infection (often called 'crypto') is a form of gastroenteritis caused by *Cryptosporidium*, a microscopic parasite. *Cryptosporidium* is present in the faecal matter of infected humans and animals. Infection occurs when the parasite is ingested, often via contaminated food and water. The disease is generally not serious, although it can be for individuals with weakened immune systems. Community outbreaks of cryptosporidiosis have been attributed to contaminated water supplies, recreational water supplies (swimming pools) and childcare centres. Cryptosporidiosis is also a common cause of acute diarrhoea in young children. The disease tends to be more common during the warmer months.

There were 76 notifications of cryptosporidiosis on average per year among MSH residents during 2018 to 2020. The age standardised notification rate for cryptosporidiosis in MSH was 10 per 100,000 population, which was not significantly different from the rate in the rest of Queensland (19 per 100,000).

Age specific notification rates were similar in MSH and the rest of Queensland for all age groups except those aged under ten years where the rate was significantly lower in MSH (Appendix 1: Table 9). Notification rates were highest among those aged under 5 years. Rates then fell with increasing age, with a second minor peak in the 30 to 39 years age groups (Figure 24).

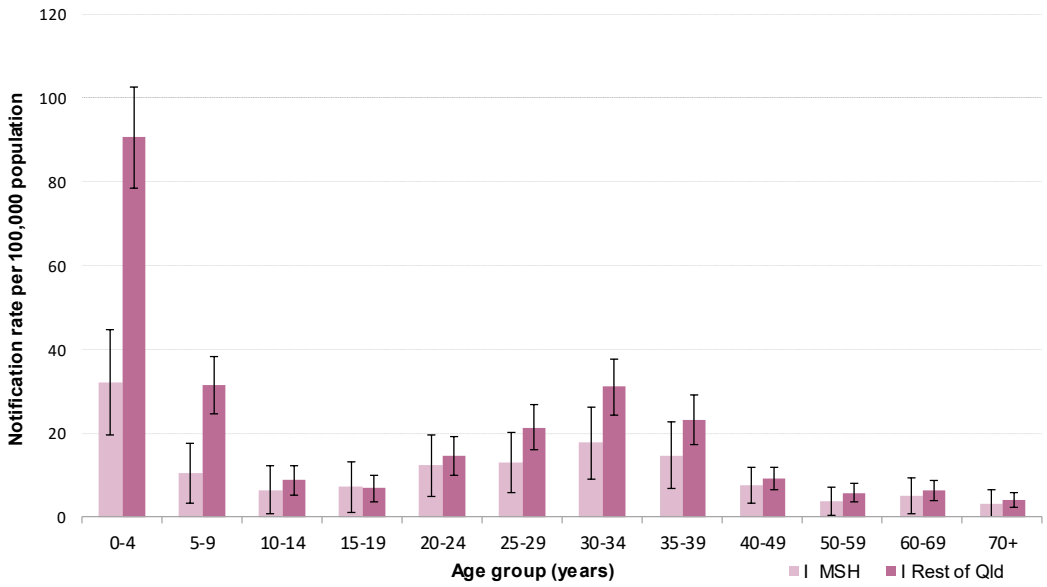


Figure 24: Cryptosporidiosis age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)

There was no significant difference in the overall cryptosporidiosis notification rate between males and females in MSH or Queensland. When broken down by age group, rates in MSH were significantly higher in females than males in those aged 20 to 39 years (Table 9).

Table 9: Cryptosporidiosis average annual notifications and rates by sex with female to male rate ratio comparisons, Metro South Health and Queensland, 2018 to 2020**

Age group (years)	Metro South Health				Queensland - All			
	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.
	Females	Males			Females	Males		
<10	16 (20.8)	17 (21.5)	0.97 (0.49 - 1.91)	—	141 (44.2)	190 (56.6)	0.78 (0.63 - 0.97)	🡻
10-19	5 (7.2)	5 (6.5)	1.12 (0.33 - 3.79)	—	24 (7.7)	25 (7.6)	1.01 (0.58 - 1.77)	—
20-29	17 (18.6)	6 (6.9)	2.71 (1.13 - 6.50)	🡹	79 (22.2)	40 (11.2)	1.98 (1.37 - 2.88)	🡹
30-39	18 (19.3)	12 (13.2)	1.46 (0.70 - 3.05)	—	107 (29.9)	64 (18.7)	1.60 (1.18 - 2.18)	🡹
40-49	6 (7.0)	6 (8.1)	0.86 (0.28 - 2.67)	—	30 (8.8)	29 (9.0)	0.98 (0.59 - 1.63)	—
50-59	<5 (#)	<5 (#)	#	#	21 (6.5)	13 (4.2)	1.54 (0.77 - 3.06)	—
60-69	<5 (#)	<5 (#)	#	#	17 (6.4)	15 (5.7)	1.13 (0.56 - 2.26)	—
70+	<5 (#)	<5 (#)	#	#	11 (3.9)	10 (4.0)	0.97 (0.42 - 2.25)	—
Total	75 (12.6)	53 (9.2)	1.24 (0.90 - 1.72)	—	431 (17.4)	386 (16.1)	1.09 (0.96 - 1.23)	—

* 🡹 Females statistically significantly higher than males; 🡻 Females statistically significantly lower than males;
— no statistically significant difference between females and males; # Not calculated because age group count fewer than 5
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Between 2009 and 2020, both counts and age standardised notification rates for cryptosporidiosis showed peaks in 2009 (data not shown), 2012 and 2015-17 with rates in intervening years markedly lower (Figure 25). Over this period, trends in MSH were similar to those in the rest of Queensland (Figure 25). 2016 saw the highest numbers of cryptosporidiosis notifications in the ten-year reporting period at almost 600. By 2018 the annual count had dropped below 200 for the first time since 2014 and counts and rates continued to fall with annual counts lower than 100 in 2019 and 2020 (Figure 25).

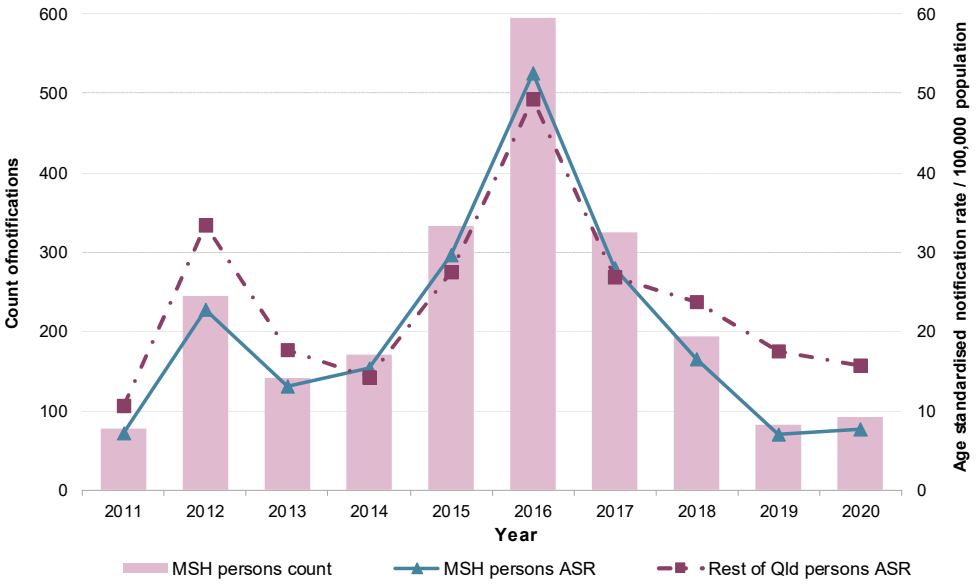


Figure 25: Cryptosporidiosis notification counts (Metro South Health) and age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

Impact of COVID-19 pandemic

In 2020 MSH counts and age standardised notification rates of Cryptosporidiosis remained at a level very comparable with that recorded in 2019. The COVID-19 pandemic does not appear to have impacted on cryptosporidiosis in MSH.

Sexually transmitted and blood borne diseases

Symptoms and other features of sexually transmitted infections (STIs) vary depending on the organism, but most infect the genital region and urinary tract as well as the uterus and cervix in females and may also involve other organs (e.g. eyes). Particularly early in the illness, STIs can be asymptomatic yet able to be spread to others. The mainstay of prevention is practicing safe sex[12]. Contact tracing and follow up by Public Health Units are also important preventive health measures.

Some blood borne diseases can also be sexually transmitted. Immunisation is an effective preventive measure for hepatitis B virus infection, included in routine childhood vaccination programs, as well as being recommended for specific high-risk groups and close contacts of people with acute hepatitis B infection.

Chlamydia

Key findings 2018 to 2020:

- average of 4,980 notifications per year among MSH residents with 2,757 in 20 to 29 year olds
- age standardised notification rate of 408 per 100,000 was significantly lower than the rest of Queensland rate
- age specific rates significantly lower in MSH than in the rest of Queensland for 10 - 49 year olds
- steady increase in notifications to 2016 particularly in 20 to 29 year olds
- notification counts and rates declined between 2016 and 2020 in most age groups except 30 to 39 years (21% increase) and 60 years and over (9% increase)
- high notification rates in young adults in MSH represent a serious public health concern
- no definite evidence of impact from COVID-19 pandemic; decrease in males may reflect decrease in testing

Chlamydia (*Chlamydia trachomatis*) is a bacterium that causes a sexually transmissible infection (STI) affecting the urethra, throat, anus as well as the cervix and uterus in females. The eyes can be infected through rubbing or touching with unwashed hands. It can be a “silent STI” without showing symptoms. Chlamydia is the most common bacterial sexually transmissible infection world-wide, with a rapid and steady increase in notifications in recent years (majority of cases in 15 to 24 year olds).

There were 4,980 notifications of chlamydia on average per year among MSH residents during 2018 to 2020. Over 2,700 (55%) of these were in persons aged 20 to 29 years and 911 (18%) in those aged 15 to 19 years. The age standardised notification rate for chlamydia in MSH was 408 per 100,000 population, which was significantly lower than the rate in the rest of Queensland of 505 per 100,000 (MSH 19% lower) (Appendix 1: Table 10).

Age specific notification rates were significantly lower in MSH than in the rest of Queensland for all people aged ten to 49 years. Across Queensland notification rates peaked among young people aged 20 to 24 years, and then decreased rapidly with increasing age (Figure 26). The rate for the 20 to 24 years age

group was 1.8 times higher than the rate in 25 to 29 years age group, 3.1 times higher than 30 to 34 year olds and 5.4 times higher than the rate in 35 to 39 year olds (Figure 26).

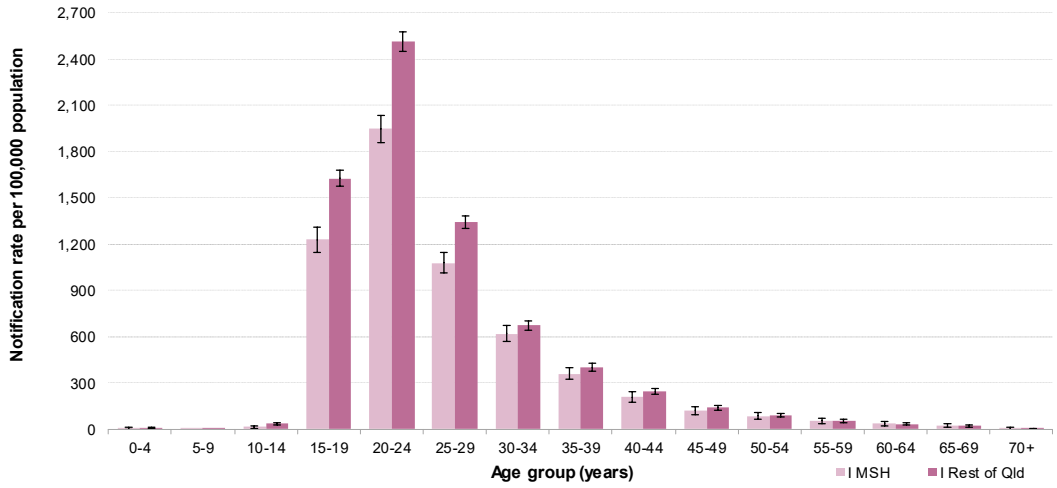


Figure 26: Chlamydia age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)

In both MSH and Queensland, notification rates were significantly higher among females than males for those aged ten to 29 years. However, in older age groups this pattern was reversed, with higher rates in males in all age groups from 30 to 59 years in MSH (Table 10). Overall across both MSH and Queensland, total notification rates were 1.3 times higher in females than in males (Table 10). Higher notification rates among young females may reflect higher levels of testing among this group, rather than higher levels of infection; however, this cannot be verified without additional, currently unavailable, data.

Table 10: Chlamydia average annual notifications and rates by sex with female to male rate ratio comparisons, Metro South Health and Queensland, 2018 to 2020**

Age group (years)	Metro South Health				Queensland - All			
	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.
	Females	Males			Females	Males		
<10	5 (6.9)	<5 (#)	#	#	17 (5.2)	14 (4.3)	1.22 (0.60 - 2.47)	—
10-19	670 (908.2)	253 (327.3)	2.78 (2.42 - 3.19)	↑	3,634 (1,143.2)	1,350 (402.4)	2.84 (2.68 - 3.02)	↑
20-29	1,591 (1739.8)	1,166 (1264.0)	1.38 (1.28 - 1.48)	↑	7,357 (2,062.1)	5,504 (1,543.9)	1.34 (1.29 - 1.38)	↑
30-39	402 (440.1)	487 (551.0)	0.80 (0.70 - 0.91)	↓	1,662 (465.1)	2,034 (594.3)	0.78 (0.73 - 0.83)	↓
40-49	114 (141.0)	150 (192.2)	0.73 (0.58 - 0.94)	↓	490 (143.4)	754 (230.5)	0.62 (0.56 - 0.70)	↓
50-59	29 (41.4)	70 (103.8)	0.40 (0.26 - 0.60)	↓	113 (35.3)	350 (114.3)	0.31 (0.25 - 0.38)	↓
60-69	<5 (#)	30 (56.9)	#	#	24 (8.8)	131 (50.7)	0.17 (0.12 - 0.25)	↓
70+	<5 (#)	5 (10.9)	#	#	<5 (#)	28 (10.8)	#	#
Total	2,817 (458.2)	2,163 (356.8)	1.28 (1.21 - 1.36)	↑	13,301 (539.6)	10,165 (421.8)	1.28 (1.25 - 1.31)	↑

* ↑ Females statistically significantly higher than males; ↓ Females statistically significantly lower than males;
— no statistically significant difference between females and males; # Not calculated because age group count fewer than 5
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

In 2018 there was a significant change to the way in which chlamydia notifications were captured and reported in the Queensland Health Notifiable Conditions System (NoCS). Prior to 2018, notifications were site-based. This could result in multiple notifications for the same person if samples were taken from multiple sites and more than one of these samples tested positive. Site-based notifications led to over-reporting of chlamydia notifications when compared with person-based notifications. From 1 January

2018 person-based notifications are reported, bringing Queensland in line with other jurisdictions for national reporting.

Across the ten-year reporting period 2011 to 2020, notification rates (males, females and all persons) in MSH were consistently lower than equivalent rates in the rest of Queensland. (Figure 27).

Between 2011 and 2016 both counts and age standardised notification rates for chlamydia showed a clear increasing trend in both males and females (Figure 27). The total number of notifications (all persons) in MSH was 42% higher in 2016 than 2011. While a substantial increase was seen in both sexes, it was proportionally greater in males (59% increase) than in females (31% increase).

Between 2016 and 2020 notification counts and rates declined in all age groups except 30 to 39 years (21% increase) and 60 years and over (9% increase). The overall annual number of MSH notifications remained relatively stable over this period (Figure 27; Figure 28).

A noticeable drop in notifications among males only was recorded in 2020 (Figure 27).This may reflect a drop in testing during the period of the COVID-19 pandemic.

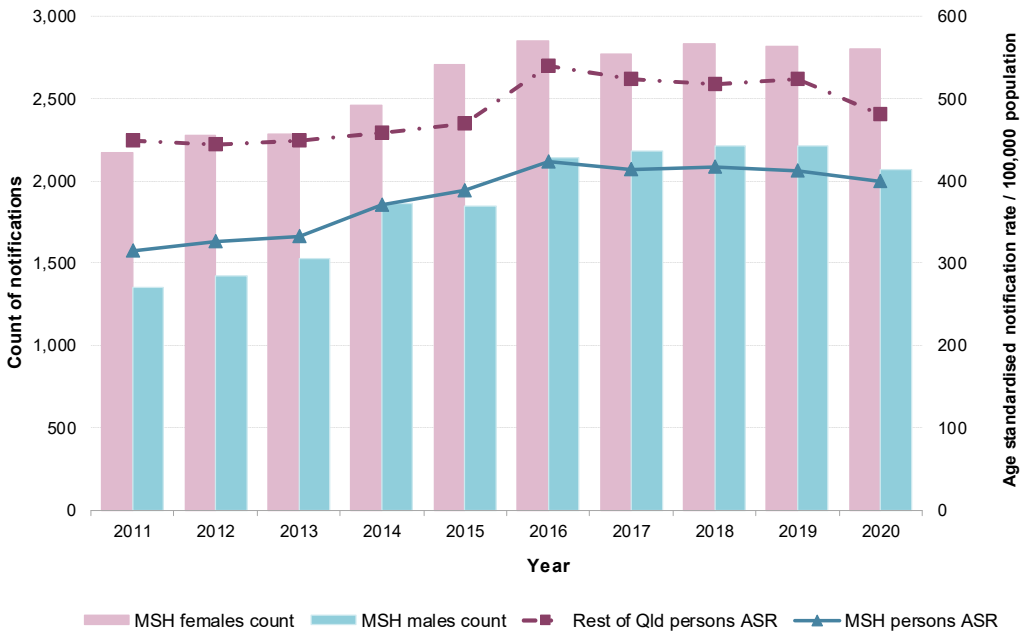


Figure 27: Chlamydia notification counts by sex (Metro South Health) and all persons age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

The increase in chlamydia notifications between 2011 and 2016 did not occur consistently across all age groups. The annual number of notifications in the 15 to 19 years age group remained between 900 and 1,000 over this period and through to 2020 (Figure 28). By comparison, notifications in the 20 to 29 years age group increased by around 38% over the same period (Figure 28). While the total number of notifications was much lower in the older age groups, these counts increased by over 100% over the ten-

year reporting period. The increase was particularly strong in the 30 to 39 years age group which increased from just under 400 notifications in 2011 to 923 in 2019.

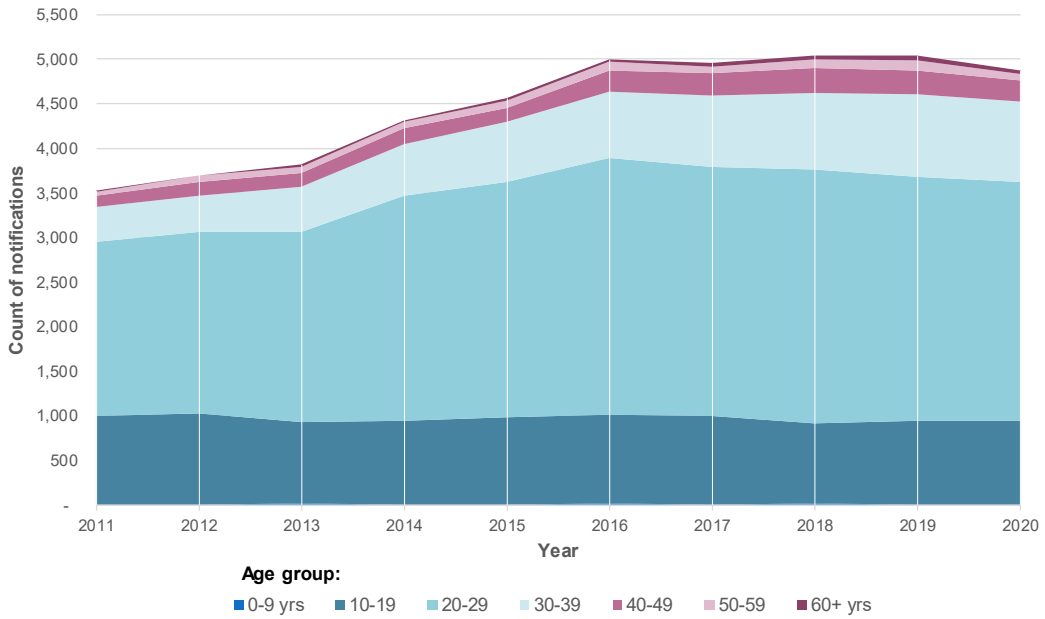


Figure 28: Chlamydia notification counts by age group (Metro South Health), all persons, 2011 to 2020

While the total number of chlamydia notifications in the 20 to 29 years age group increased over the reporting period, the proportion of all notifications that were in this age group remained almost constant at between 55% and 58% across the ten-year period (Figure 29). However, over the same period the proportion of notifications in persons aged under 20 years decreased from 28% in 2011-12 to 19% in 2019-20. There was a corresponding increase in notifications in those aged 30 years and over across this period from 17% to 26% (Figure 29). Trends in the rest of Queensland followed a similar pattern.

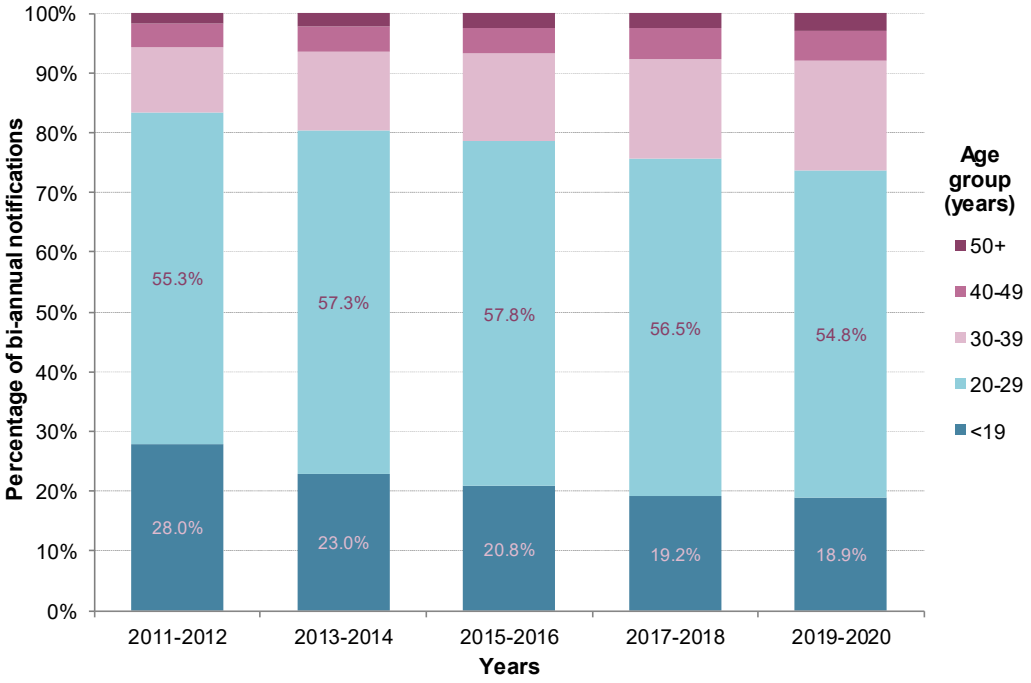


Figure 29. Chlamydia biannual notification proportions by age group, Metro South Health, 2011 to 2020

Impact of COVID-19 pandemic

A noticeable decrease among males (only) was recorded in 2020 in both the annual count and rate of notifications of chlamydia in MSH and the rest of Queensland. However it is not possible to determine whether this decrease was the result of the COVID-19 pandemic or other factors. It is possible that the decrease reflects a drop in testing during the period of the COVID-19 pandemic.

Gonorrhoea

Key findings 2018 to 2020:

- average of 1,340 notifications per year among MSH residents
- age standardised rate of 111 per 100,000 significantly lower than rest of Queensland rate
- age specific rates significantly lower in MSH than rest of Queensland for 10 to 19 years age group
- notification rates highest in young adults aged 20 to 29 years
- age standardised rate significantly higher in males than females
- substantial increase in notifications in recent years particularly in 15 to 29 year olds but also in those 30 to 54 years
- no definite evidence of impact from COVID-19 pandemic; decrease in males may reflect decrease in testing

Gonorrhoea (*Neisseria gonorrhoea*) is a sexually transmissible bacterium that can infect the urethra, throat, anus and cervix. The eyes can also be infected and occasionally the infection can become disseminated and may involve the joints and skin. Male urethral infection is likely to be symptomatic, but infection at other sites is often asymptomatic. Condom use is the mainstay of prevention for gonorrhoea[12].

There were 1,340 notifications of gonorrhoea on average per year among MSH residents during 2018 to 2020. Over 600 of these (45%) were in persons aged 20 to 29 years with a further 395 (29%) in those aged 30 to 39 years. The age standardised notification rate for gonorrhoea in MSH was 110 per 100,000 population, which was significantly lower than the rate in the rest of Queensland rate of 119 per 100,000 (MSH 7% lower).

Age specific notification rates were significantly lower in MSH than in the rest of Queensland for those in the ten to 19 years age group (Appendix 1: Table 11). In both MSH and the rest of Queensland, rates peaked in the 20 to 24 years age group, remained high in 25 to 29 year olds and then fell with increasing age (Figure 30).

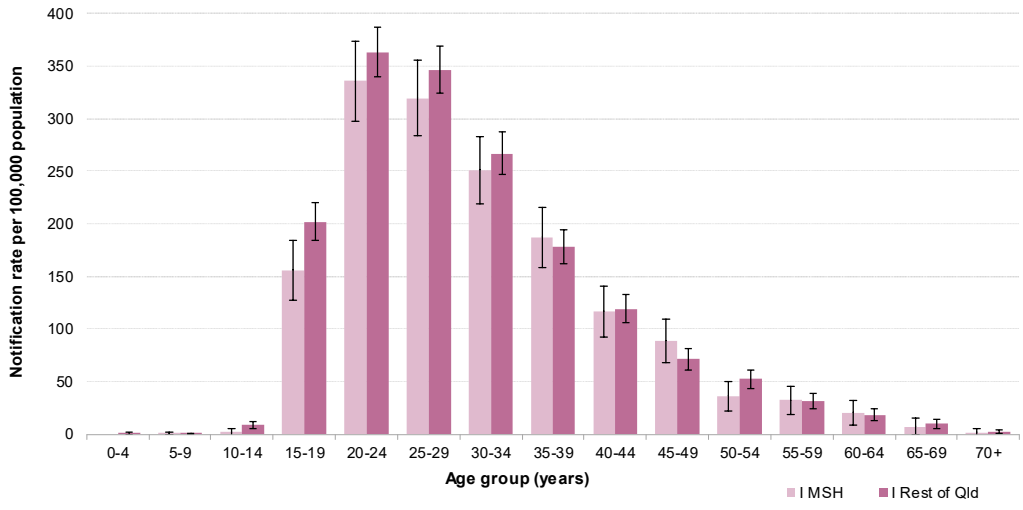


Figure 30: Gonorrhoea age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals)

Notification rates were significantly lower among females than males for those aged 20 to 59 years in both MSH and Queensland. The overall age standardised notification rate in MSH males was 2.0 times higher than in females (Table 11).

Table 11: Gonorrhoea average annual notifications and rates by sex with female to male rate ratio comparisons, Metro South Health and Queensland, 2018 to 2020**

Age group (years)	Metro South Health				Queensland - All			
	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male (95% Conf. Int.)	Signif. diff.
	Females	Males			Females	Males		
<10	<5 (#)	<5 (#)	#	#	<5 (#)	<5 (#)	#	#
10-19	60 (80.9)	57 (74.1)	1.09 (0.76 - 1.57)	—	374 (117.5)	257 (76.7)	1.53 (1.31 - 1.79)	↑
20-29	208 (227.8)	393 (425.7)	0.54 (0.45 - 0.63)	↓	961 (269.3)	1,518 (425.7)	0.63 (0.58 - 0.69)	↓
30-39	123 (134.7)	272 (307.6)	0.44 (0.36 - 0.54)	↓	463 (129.5)	1,091 (318.7)	0.41 (0.37 - 0.45)	↓
40-49	45 (55.7)	118 (151.1)	0.37 (0.27 - 0.51)	↓	174 (50.9)	469 (143.4)	0.35 (0.30 - 0.42)	↓
50-59	11 (16.0)	36 (53.4)	0.30 (0.16 - 0.56)	↓	47 (14.5)	205 (67.0)	0.22 (0.16 - 0.29)	↓
60-69	<5 (#)	15 (28.1)	#	#	10 (3.7)	66 (25.5)	0.15 (0.08 - 0.26)	↓
70+	<5 (#)	<5 (#)	#	#	<5 (#)	11 (4.1)	#	#
Total	449 (73.4)	891 (148.8)	0.49 (0.44 - 0.55)	↓	2,030 (82.8)	3,617 (151.9)	0.54 (0.51 - 0.57)	↓

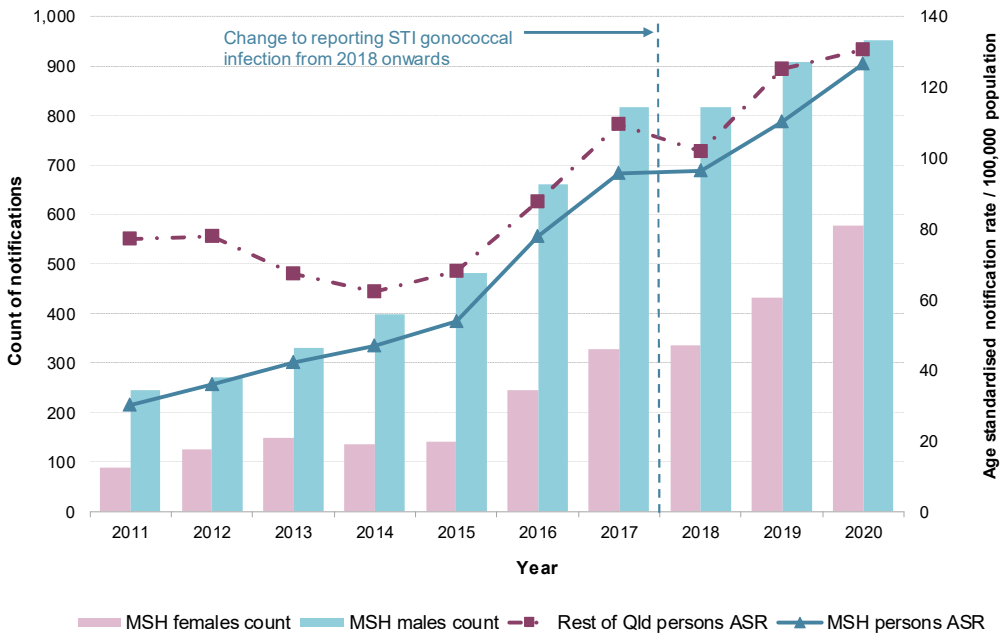
* ↑ Females statistically significantly higher than males; ↓ Females statistically significantly lower than males;
— no statistically significant difference between females and males; # Not calculated because age group count fewer than 5.
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

In 2018 there was a major change to the way in which gonorrhoea notifications were captured and reported in NoCS. Prior to 2018 notifications were site-based which could result in multiple notifications for the same person if samples were taken from multiple sites and is more than one of these samples tested positive. This led to the over-reporting of gonorrhoea notifications (estimated to be 9% higher in Queensland in 2016) when compared with person-based notifications. From 1 Jan 2018 person-based notifications are reported (Figure 31), bringing Queensland in line with other jurisdictions for national reporting.

Between 2006 and 2009 (data not shown), notification rates for gonorrhoea in both MSH and the rest of Queensland were fairly stable. However, from 2009 onwards rates increased markedly in both MSH and the rest of Queensland (Figure 31). From 2011 to 2019, the annual number of notifications in MSH females was consistently less than 50% of the number in males (Figure 31). In 2020 the proportion of female notifications rose to be 60% of the male count (Figure 31).

The number of MSH notifications in males in 2020 was 3.9 times higher than the number in 2011. While the rate of increase in notifications in males has slowed in the most recent years there remains evidence of an ongoing epidemic of gonorrhoea in the young adult male population of MSH (Figure 31). The rest of Queensland also experienced substantial increases with male notifications almost three times higher in 2018 than in 2009 (data not shown).

The number of notifications in MSH females was 6.5 times higher in 2020 than in 2011, with the steepest increase recorded between 2018 and 2020 (72% increase in two years) (Figure 31). This provides suggestive evidence that the gonorrhoea epidemic is spreading from the male into the female population.



* Notifications from 1 January 2018 represent discrete individuals whereas notifications prior to that date represent infection site-specific positive results and may include more than one notification per individual

Figure 31: Gonorrhoea (infectious) notification counts by sex (Metro South Health) and all persons age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020*

Gonorrhoea notification rates in MSH were consistently lower than the equivalent rates in the rest of Queensland, for all persons across the ten-year reporting period (Figure 31). However the gap narrowed from 2014 onwards. Examination of the data by sex indicated that the gap between MSH and the rest of Qld had completely closed for males while remaining open for females (data not shown).

The observed increase in gonorrhoea notifications was not consistent across all age groups. The annual number of notifications in the 15 to 19 years age group was 2.8 times higher in 2020 than in 2011 (Figure 32). By comparison, notifications in the 20 to 29 years age group were 3.7 times higher in 2020 than in 2011, those 30 to 39 years were 8.2 times higher in 2020, those 40 to 49 years were 5.3 times higher and those 50 years and over were 3.3 times higher in 2020 (Figure 32). The crude age specific rate of gonorrhoea notifications in those aged 30 years and over rose more than five-fold from 20 per 100,000 population in 2011 to 112 per 100,000 in 2020. While the total number of notifications in the older age groups was much lower, the increases over the reporting period were substantial and concerning as they illustrated an epidemic of gonorrhoea spreading into older age groups.

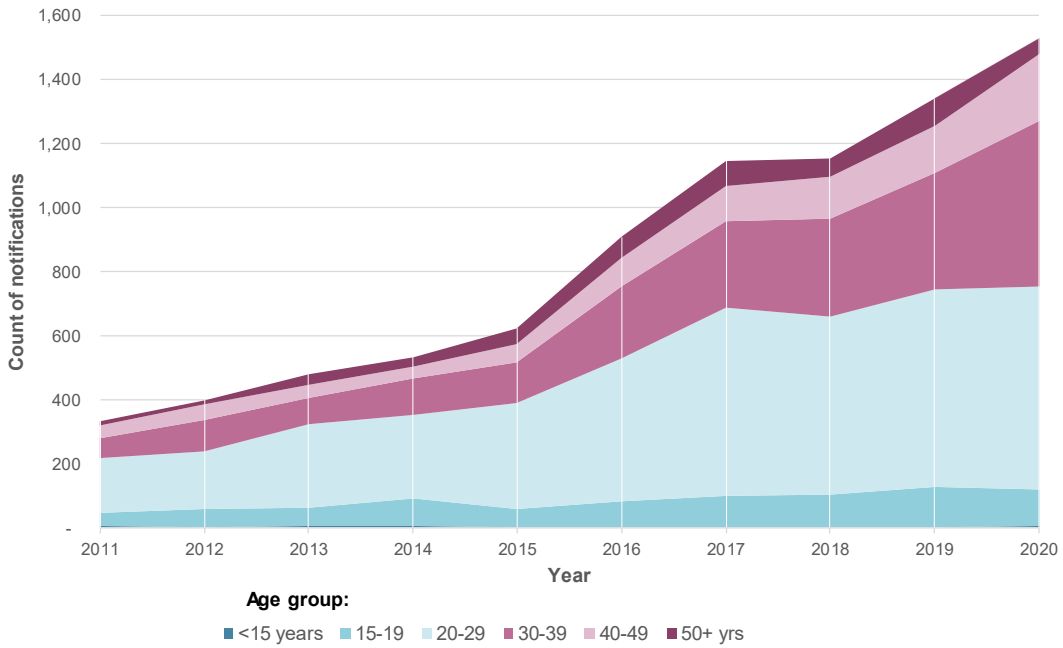


Figure 32: Gonorrhoea notification counts by age group (Metro South Health), all persons, 2011 to 2020

While the total number of gonorrhoea notifications in the 20 to 29 years age group increased over the reporting period (Figure 32), the proportion of notifications in this age group decreased from around 50% to 44% over the ten-year period (Figure 33). Over the same period the proportion of notifications in persons aged under 20 years decreased from around 15% in 2011-14 to 9% in 2019-20. There was a corresponding increase in the proportion of notifications in those aged 30 years and over across this period from around 35% to 48% (Figure 33).

Trends in the proportion of notifications by age group in the rest of Queensland followed a similar pattern to MSH but with greater decreases in persons under 20 years and greater increases in those aged 30 to 39 and 40 to 49 years (Figure 34).

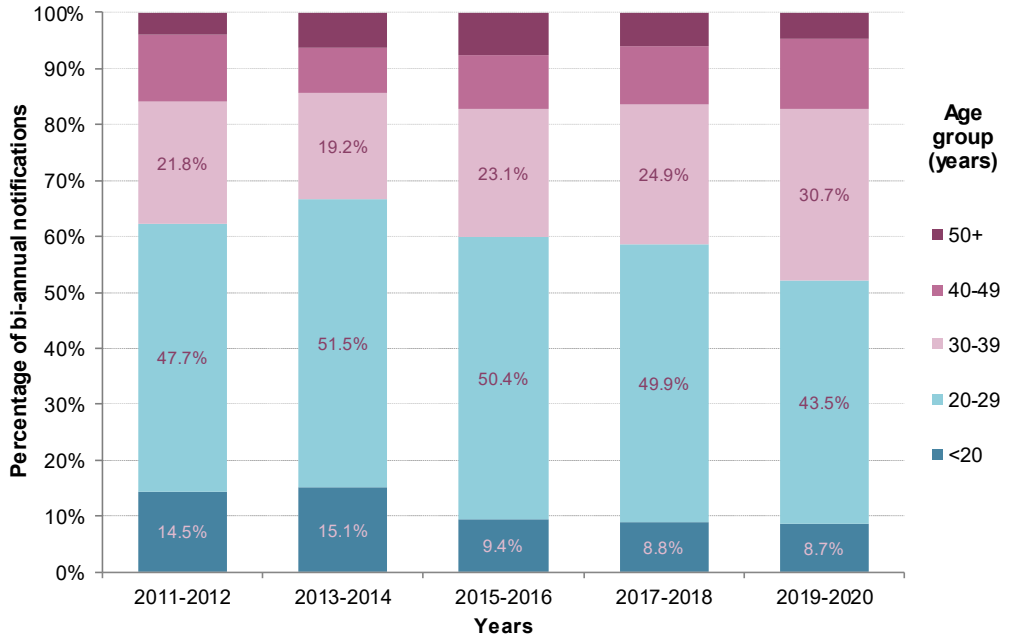


Figure 33. Gonorrhoea biannual notification proportions by age group, Metro South Health, 2011 to 2020

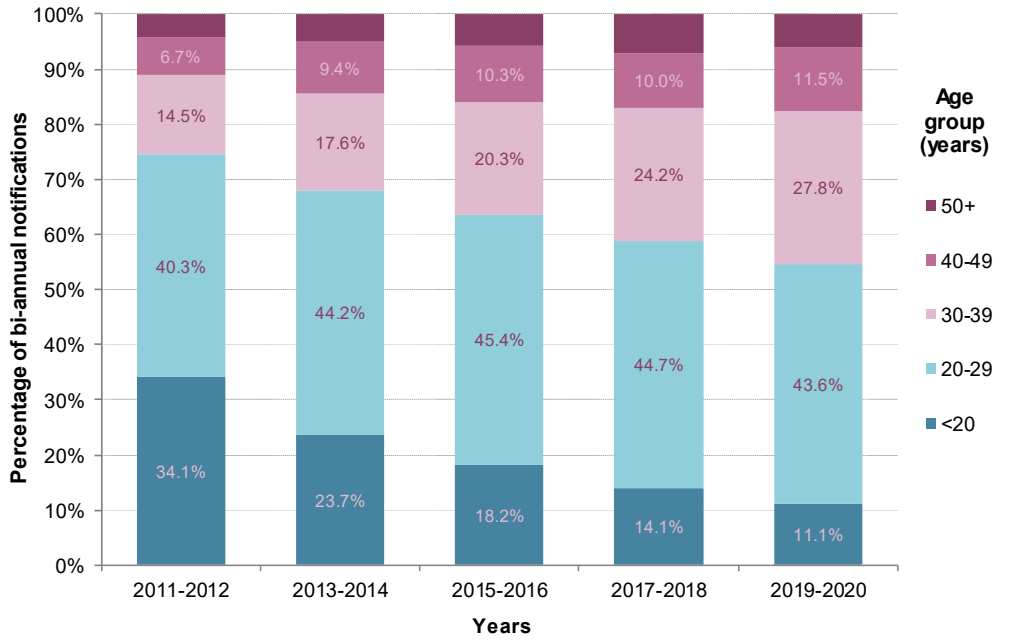


Figure 34. Gonorrhoea biannual notification proportions by age group, rest of Queensland, 2011 to 2020

Impact of COVID-19 pandemic

A noticeable increase in both the annual count and rate of notifications of gonorrhoea in MSH and the rest of Queensland was recorded in 2020. This increase was mainly centred in females. However as these changes continue trends already established in the preceding years it is not possible to determine whether the increase was the result of the COVID-19 pandemic or other factors.

Syphilis (infectious, less than 2 years duration)

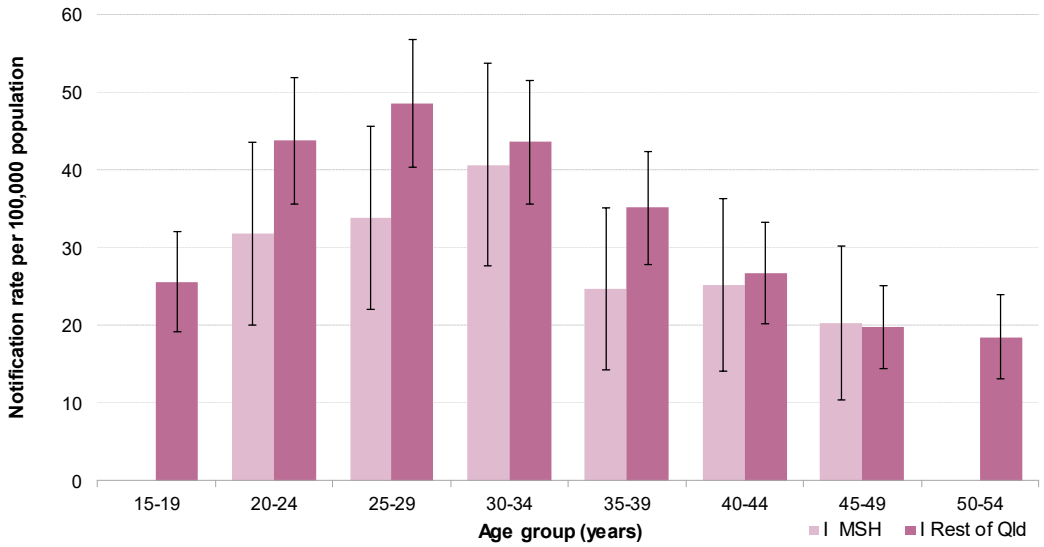
Key findings 2018 to 2020:

- average of 192 infectious syphilis notifications per year among MSH residents
- age standardised rate of 16 per 100,000 significantly lower than the rest of Queensland rate
- age specific rates significantly lower in MSH than the rest of Queensland for 10 to 29 year olds
- notification rate increased markedly to 2018 but has decreased slightly to 2020
- no definite evidence of impact from COVID-19 pandemic

Syphilis (*Treponema pallidum*) is a sexually transmissible bacterium. There are several stages and symptoms vary according to the stage of infection, and some people may be asymptomatic. The initial or primary stage is typically a painless ulcer (chancre) which resolves spontaneously and is followed by the secondary stage of infection, where symptoms can include rash, malaise and generalised lymphadenopathy. These early stages of syphilis are highly infectious. In later stages there are typically fewer symptoms and a lower rate of transmission[12,13].

On average there were 192 notifications of infectious syphilis per year among MSH residents during the period 2018 to 2020. The age standardised notification rate for infectious syphilis in MSH was 16 per 100,000 population, which was significantly lower than the rate in the rest of Queensland of 20 per 100,000 (MSH 20% lower).

Age specific notification rates were significantly lower in MSH than in the rest of Queensland for 10 to 29 years age groups (Appendix 1; Table 12). Rates peaked in the 30 to 34 years age group in MSH (25 to 29 years in the rest of Queensland) and then generally decreased with increasing age (Figure 35).



* rates not presented for age groups under 15 years and over 54 years (rest of Queensland) or under 20 years and over 49 years (MSH) because of low or zero counts

Figure 35: Syphilis age specific notification rates, Metro South Health and Queensland, 2018 to 2020 (with 95% confidence intervals)*

Between 2014 and 2017 syphilis notification counts and age standardised rates showed a clear increasing trend in both MSH and the rest of Queensland (Figure 36). In MSH this increase continued into 2018. Following these sharp increases, rate declines to 2020 were observed in both MSH and the rest of Queensland (Figure 36). Across the ten-year-reporting period, the notification rate in MSH was consistently lower than the rate in the rest of Queensland, with the gap narrowing in recent years as the rate in the rest of Queensland decreased faster than in MSH (Figure 36).

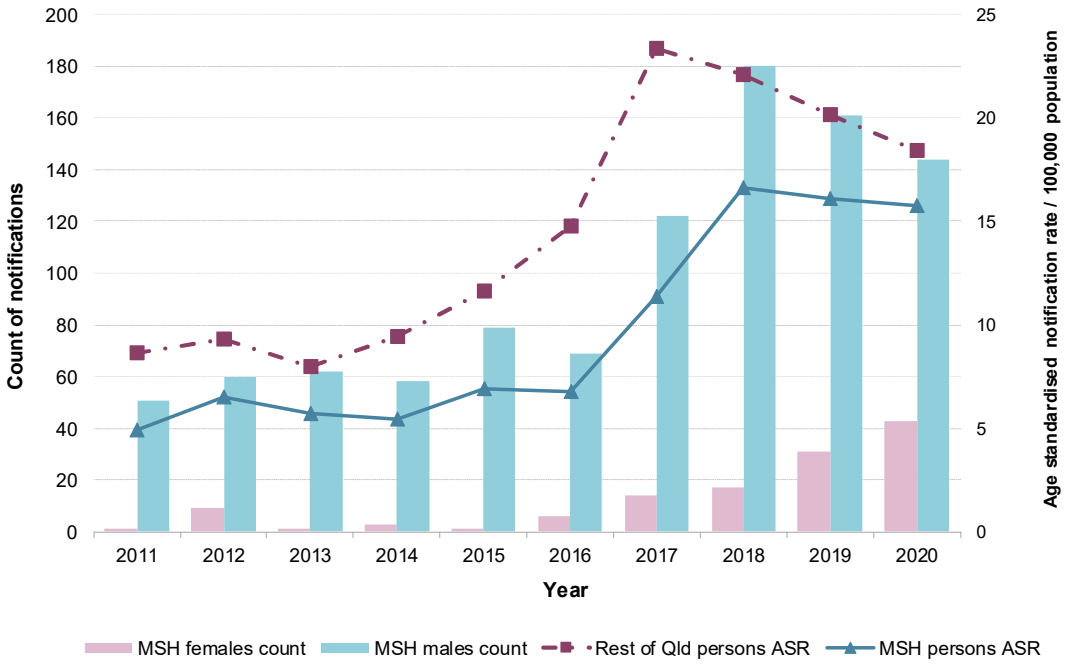


Figure 36: Syphilis (infectious) notification counts by sex (Metro South Health) and all persons age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

The total annual number of notifications in MSH rose from 52 in 2011 to almost 200 in 2018. The vast majority of these notifications were in males (Figure 36). There is evidence that the sex distribution of syphilis notifications is changing. Prior to 2016 females accounted for less than 5% of total notifications. However, from 2016 onwards there has been a steady increase in the proportion of female notifications, peaking at 23% in 2020

In contrast to chlamydia and gonorrhoea, increases in syphilis notifications between 2011 and 2020 were relatively evenly spread across all five-year age groups from 15 to 59 years (data not shown).

Impact of COVID-19 pandemic

A noticeable decrease among males and increase among females was recorded in 2020 in both the annual count and rate of notifications of syphilis in MSH. However given that these changes continue patterns already established in the two to three preceding years it is not possible to determine whether they reflected the impact of the COVID-19 pandemic or other factors. It is possible that the decrease in males reflects a drop in testing during the period of the COVID-19 pandemic.

Hepatitis B (newly acquired / acute)

Key findings 2018 to 2020:

- average of 9 notifications per year among MSH residents; 46 per year in all of Queensland
- annual numbers too small for accurate age or sex specific rates to be calculated
- no evidence of any impact from COVID-19 pandemic

Hepatitis B is an infection caused by the hepatitis B virus, which causes inflammation of the liver and can affect people of all ages. Hepatitis B is one of the most serious types of hepatitis. The virus can cause either acute or chronic liver disease (including liver cancer).

Hepatitis B can be effectively prevented through immunisation with vaccination offered under the National Immunisation Program schedule to children at birth, six weeks, four and six months of age; and to various at-risk groups, including close contacts of people with acute or chronic hepatitis B. Catch-up vaccines are funded for people up to 20 years of age.

On average there were nine notifications of acute hepatitis B per year among MSH residents and 46 notifications per year in all of Queensland during the period 2018 to 2020. Because of the low number of notifications of newly acquired or acute hepatitis B, accurate age standardised, and age specific rates cannot be calculated.

Between 2018 and 2020 most of the acute hepatitis B notifications for MSH (71%) and Queensland (80%) were in the 20 to 54 years age group. In MSH, no notifications were recorded for age groups between birth and 14 years and adults 70 years and older.

The majority of the acute hepatitis B notifications (72%) over the ten-year reporting period (2011 to 2020) were in males. Over this period notification counts in both MSH and the rest of Queensland were variable, not showing any consistent pattern (Figure 37).

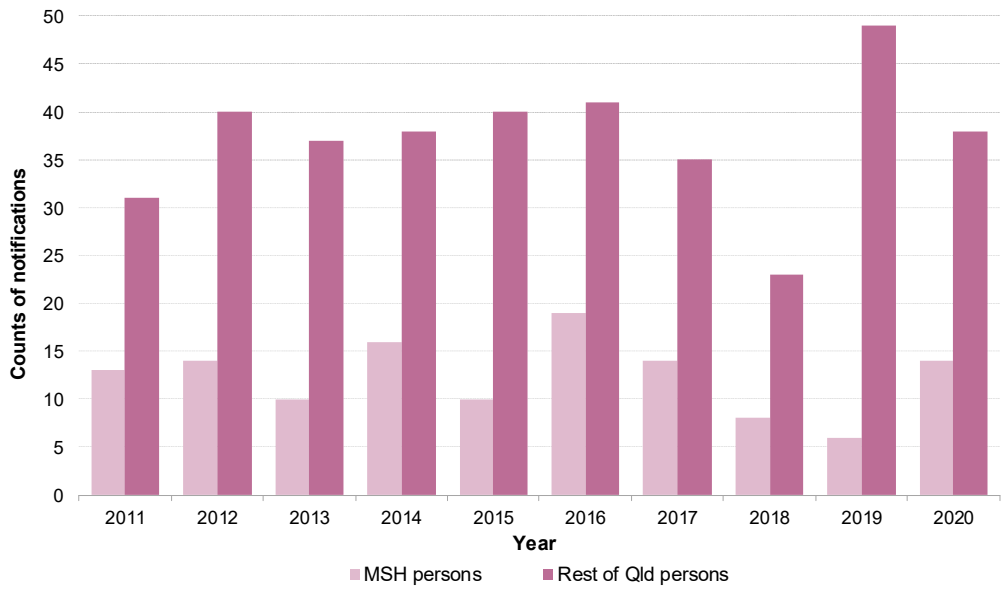


Figure 37: Hepatitis B (newly acquired) annual counts of notifications, Metro South Health and rest of Queensland, 2011 to 2020

Hepatitis C (all notifications)

Key findings 2018 to 2020:

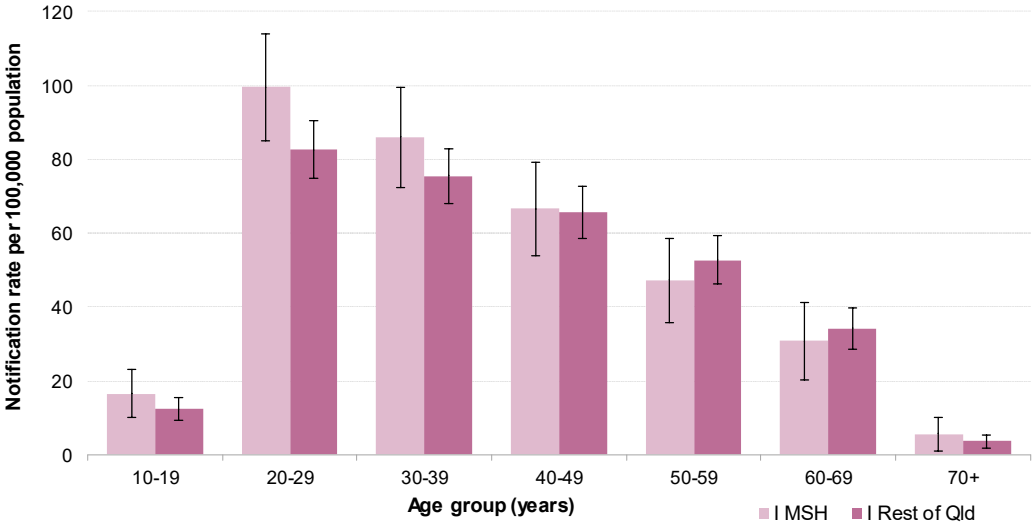
- average of 577 notifications per year among MSH residents with 117 of these being newly acquired
- age standardised rates in MSH 48 per 100,000 (all cases) and 9.4 per 100,000 (newly acquired) both similar to rates in the rest of Queensland
- age specific rates in MSH significantly higher than the rest of Queensland for 20 to 29 year olds
- more than 70% of all notifications in males
- decrease in notifications in males in 2020 may reflected a drop in testing during the period of the COVID-19 pandemic

Hepatitis C is a virus that causes inflammation of the liver, and is transmitted through blood to blood contact. Most people who are infected with hepatitis C will go on to have chronic (long term) hepatitis C, which may cause ongoing disease of the liver. People who have chronic infection can pass the infection on to other people. They are carriers of hepatitis C.

There was an average of 577 notifications of hepatitis C per year among MSH residents during the period 2018 to 2020 with 117 of these (20%) being newly acquired cases. The MSH age standardised notification rates for both hepatitis C (all cases) (48 per 100,000 population) and hepatitis C (newly acquired cases) (9.4 per 100,000 population) were statistically similar to the rates in the rest of Queensland (44 and 9.5 per 100,000 respectively).

The hepatitis C (all cases) age specific rate for 20 to 29 year olds was significantly higher in MSH than in the rest of Queensland (Appendix 1; Table 13). In MSH and the rest of Queensland rates peaked in the 20 to 29 years age group and then fell with increasing age (Figure 38). The peak age group for newly acquired cases was 20 to 29 years in both MSH and the rest of Queensland (data not shown) with 58% of new MSH cases in this age group.

The majority of hepatitis C (all cases) in both MSH (75%) and the rest of Queensland (72%) were detected in males. There were 3.0 times more cases (all cases) in males in MSH than in females (Table 12). The difference in notifications between the sexes was even more pronounced in the newly acquired cases where there were 4.9 times more in MSH males than in MSH females (data not shown). It is possible that the higher numbers of notifications (and higher age standardised rates) rates among males may reflect higher levels of testing rather than higher levels of infection; however this cannot be verified without additional, data which are currently unavailable.



* rates not presented for <10 years age group for MSH and rest of Qld because of low or zero counts

Figure 38: Hepatitis C (all cases) age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020* (with 95% confidence intervals)

In both MSH and Queensland, notification rates were significantly lower among females than males overall and across all ten-year age groups from ten to 69 years (Table 12). Total case numbers were too low to present age specific rates for newly acquired cases only.

Table 12: Hepatitis C (all cases) average annual notifications and rates by sex with female to male rate ratio comparisons, Metro South Health and Queensland, 2018 to 2020**

Age group (years)	Metro South Health				Queensland - All			
	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male	Signif. diff.	Average no. of notifications (rate per 100,000 pop.)		Ratio female : male	Signif. diff.
	Females	Males	(95% Conf. Int.)		Females	Males	(95% Conf. Int.)	
<10	<5 (#)	<5 (#)	#	#	<5 (#)	8 (2.5)	#	#
10-19	6 (8.6)	19 (24.1)	0.36 (0.15 - 0.84)	🡻	23 (7.1)	65 (19.3)	0.37 (0.23 - 0.59)	🡻
20-29	36 (39.7)	147 (159.0)	0.25 (0.18 - 0.35)	🡻	130 (36.3)	491 (137.6)	0.26 (0.22 - 0.32)	🡻
30-39	37 (40.5)	118 (133.2)	0.30 (0.21 - 0.43)	🡻	145 (40.6)	402 (117.4)	0.35 (0.29 - 0.41)	🡻
40-49	32 (39.2)	74 (95.0)	0.41 (0.28 - 0.62)	🡻	129 (37.8)	312 (95.3)	0.40 (0.33 - 0.48)	🡻
50-59	20 (28.7)	45 (66.7)	0.43 (0.26 - 0.71)	🡻	106 (33.1)	217 (70.9)	0.47 (0.37 - 0.59)	🡻
60-69	11 (20.2)	22 (42.2)	0.48 (0.24 - 0.96)	🡻	62 (23.0)	115 (44.6)	0.52 (0.38 - 0.70)	🡻
70+	<5 (#)	<5 (#)	#	#	6 (2.2)	16 (6.3)	0.34 (0.14 - 0.82)	🡻
Total	146 (24.1)	431 (73.0)	0.33 (0.28 - 0.39)	🡻	604 (23.7)	1,626 (67.3)	0.35 (0.32 - 0.39)	🡻

* 🡹 Females statistically significantly higher than males; 🡻 Females statistically significantly lower than males;
— no statistically significant difference between females and males; # Not calculated because age group count fewer than 5.
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Between 2011 and 2016, age standardised notification rates for hepatitis C (all cases) were fairly stable in both MSH and the rest of Queensland. However from 2016 to 2020 notification rates trended downwards (Figure 39) with this being somewhat more pronounced in MSH than in the rest of Queensland.

The annual number of notifications (all cases) in MSH fell from 659 in 2011 to 522 in 2020, representing an overall 21% decrease. Over this period the number of notifications in males was consistently more than double the number in females. The number of notifications in females decreased between 2016 and 2018 and then remained level whereas males showed smaller decreases with a larger drop in 2020 (Figure 39).

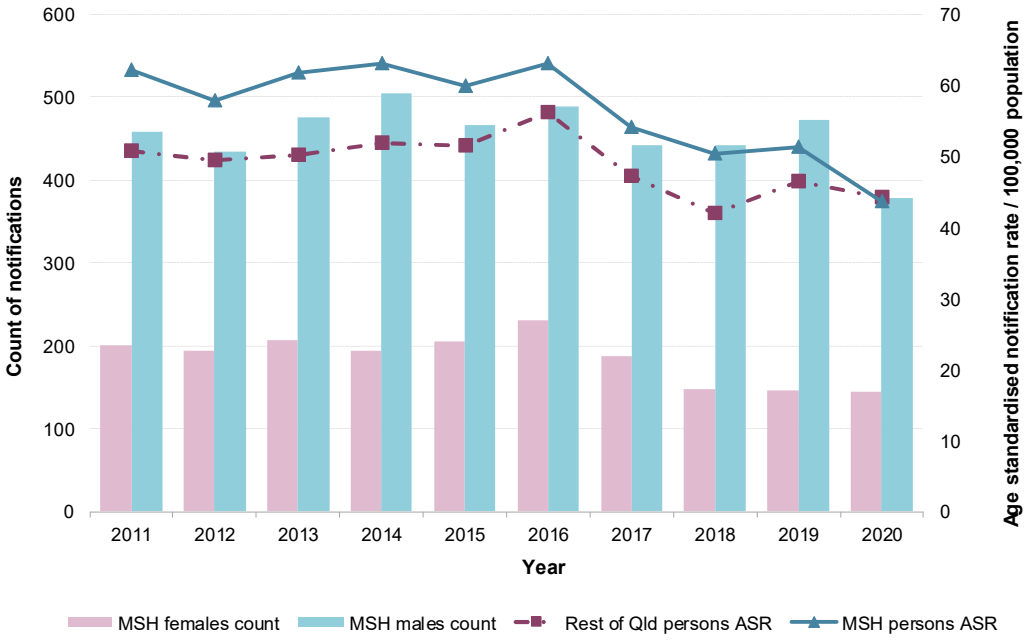


Figure 39: Hepatitis C (all cases) notification counts by sex (Metro South Health) and all persons age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

The total annual number of newly acquired case notifications of hepatitis C in MSH rose from 71 in 2011 to a peak of 143 in 2019, representing a doubling over this period. There was then a substantial decline in male cases in 2020. Over the ten-year reporting period the number of notifications in males varied from two to over seven times the number in females (Figure 40). The number of notifications in males trended upwards until the drop in 2020 while the number in females did not show any consistent pattern (Figure 40).

Between 2011 and 2019, age standardised notification rates for newly acquired hepatitis C trended slightly upwards in MSH and strongly upwards in the rest of Queensland with rates consistently higher in MSH (Figure 40). In 2020 the rate in MSH dropped below that of the rest of Queensland for the first time.

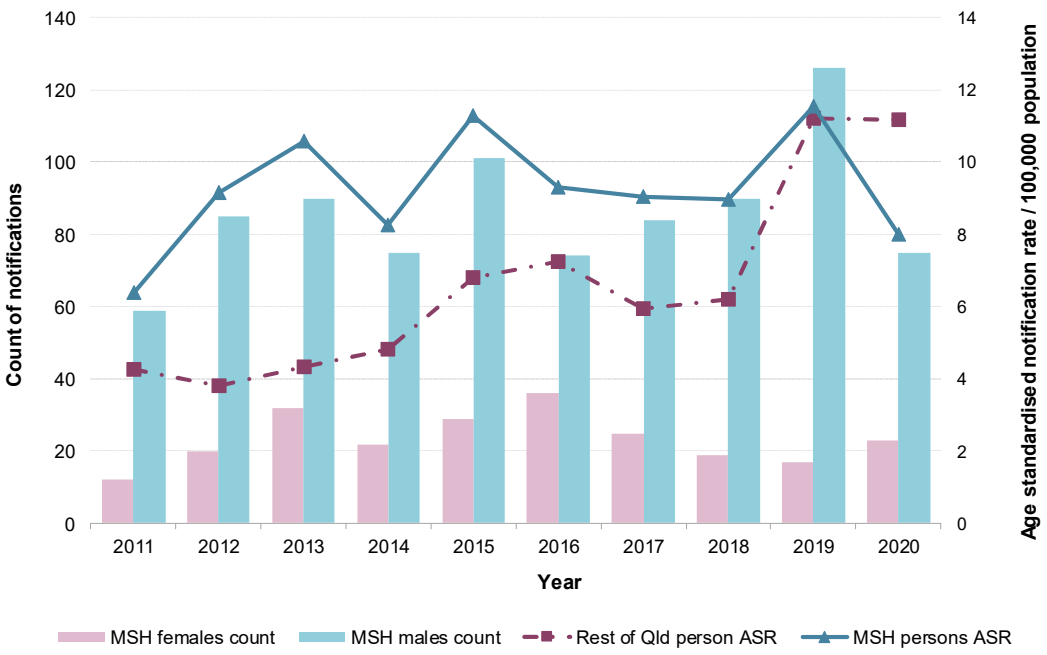


Figure 40: Hepatitis C (newly acquired cases) notification counts by sex (Metro South Health) and all persons age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

Impact of COVID-19 pandemic

A noticeable decrease among males and increase among females was recorded in 2020 in the annual count of notifications of newly acquired cases of Hepatitis C in males in MSH. Given that the number of notifications in males in 2020 was comparable with the count in several of the preceding years it is not possible to determine whether the observed decrease reflected the impact of the COVID-19 pandemic or other factors. However it is possible that the decrease in males reflected a drop in testing during the period of the COVID-19 pandemic.

Vector borne diseases

The vector borne diseases highlighted in this report are transmitted through different mosquito species and their prevalence and ability to spread locally reflect this. **Dengue fever** is spread mostly by *Aedes aegypti* mosquitoes, found in Northern Queensland, where local spread can occur when infections are imported by travellers. Due to the lack of *A.aegypti* in the MSH region, the vast majority of Dengue fever notifications in MSH are among travellers returning from overseas. **Ross River virus** is spread to humans most commonly by *Culex annulirostris* (freshwater breeding mosquito), *Aedes vigilax* (salt marsh mosquito) and *Aedes notoscriptus* (breeds in stagnant water containers close to homes etc.). **Barmah Forest virus** is found only in Australia and is spread by mosquitoes that may have become infected from marsupials or infected humans[12].

Public health action for vector borne diseases includes mosquito surveillance and control, mostly through local councils with public health teams supporting urgent control around residences of patients diagnosed with locally acquired Dengue fever. Surveillance is undertaken for other exotic vector borne diseases potentially imported by travellers.

Dengue

Key findings 2018 to 2020:

- average of 41 notifications per year in MSH residents; 148 in all of Queensland
- annual numbers of notifications too low for accurate age standardised notification rates to be calculated for MSH
- majority of notifications were in persons aged 20 to 69 years
- no evidence of any impact from COVID-19 pandemic

On average there were 41 notifications of Dengue fever per year among MSH residents during the period 2018 to 2020 (Appendix 1: Table 15). By comparison on average there were 148 notifications per year in Queensland in this period. The MSH notifications comprised 28% of the Queensland total. Notifications were spread across all age groups with the majority in the 20 to 69 years bracket (75% in MSH).

Because of the low number of notifications of dengue fever, accurate age standardised, and age specific rates could not be calculated for MSH for 2018 to 2020. The age standardised notification rate in Queensland was 2.9 per 100,000 with cases spread throughout all age groups (Appendix 1: Table 15).

The number of Dengue fever notifications in MSH increased between 2011 and 2019 with fewer than 20 notifications per year recorded before 2013 and over 70 recorded in 2019. In 2020 the number of notifications crashed to five in MSH and 30 in the rest of Queensland most likely reflecting the very limited overseas travel that occurred in the general population for most of that year (Figure 41).

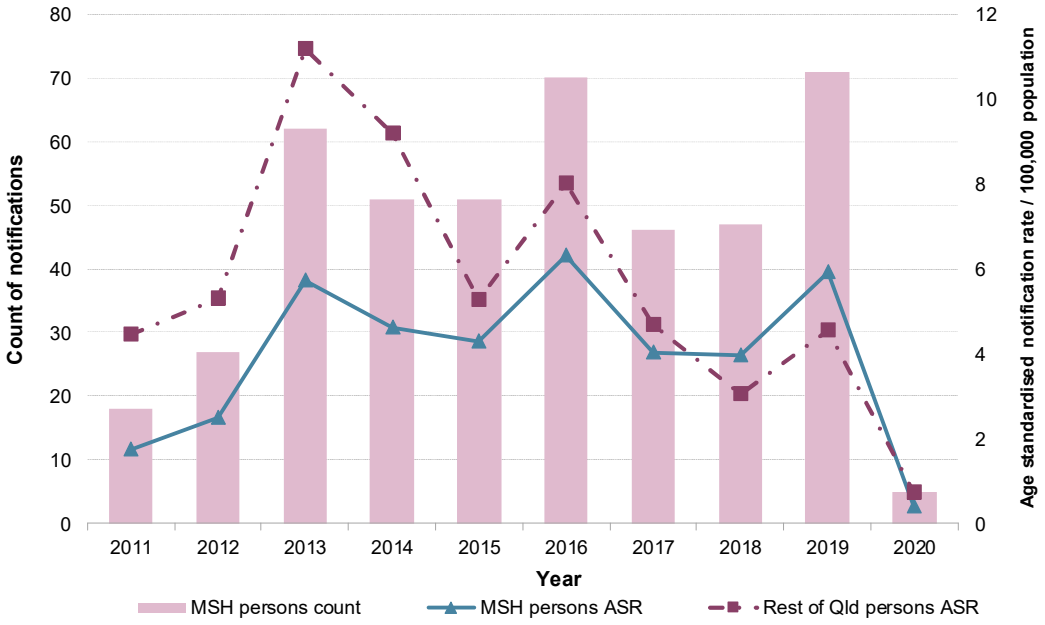


Figure 41: Dengue fever notification counts (Metro South Health) and all persons age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020

Impact of COVID-19 pandemic

The annual count of Dengue fever notifications fell sharply in 2020 in MSH and the rest of Queensland. Given that all MSH infections are imported by travellers, the crash is most likely to be a direct result of the closure of the Australian borders due to the COVID-19 pandemic and the almost complete cessation of overseas tourism for most of the year.

Ross River virus

Key findings 2018 to 2020:

- average of 299 notifications per year in MSH residents
- age standardised rate of 25 per 100,000 significantly lower than the rest of Queensland rate
- majority of notifications in persons aged 30 to 69 years
- notification rate and count doubled to 2020, unclear if increase linked to COVID-19 pandemic

From the start of 2016, the national surveillance case definition for Ross River virus infection was updated so that a single positive serology result would no longer meet the case definition for infection, reducing the likelihood of false positive notifications. This is likely to have improved the validity of Ross River virus notifications but makes comparisons of valid cases with previous years impossible. Pre-2016 trends are reported in the MSH Immunisation and Communicable Disease Notifications (2014-2016) report[14].

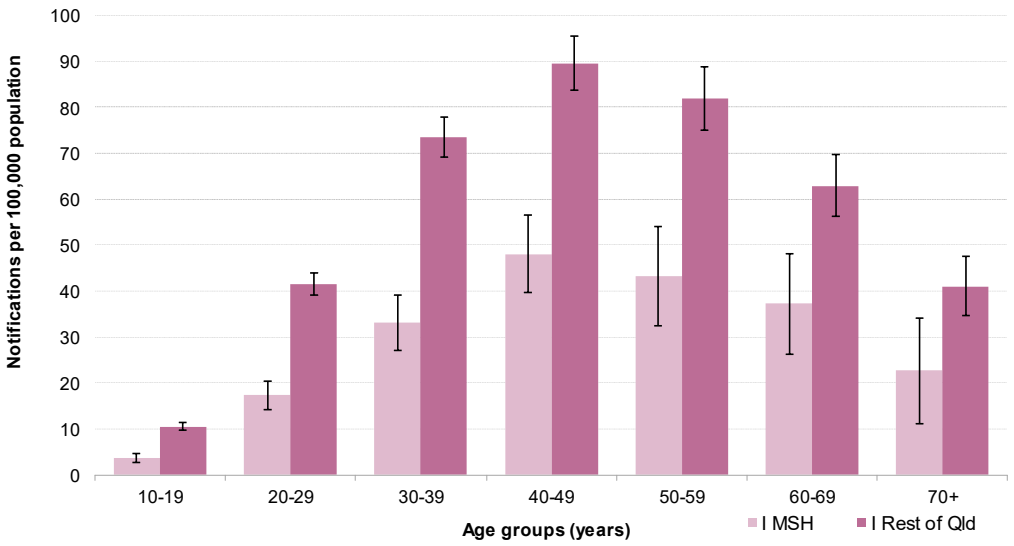
As a result of this case definition change there was a massive drop in the number of valid cases recorded, with annual MSH totals of fewer than five in 2016, 2017 and 2019, nil in 2018 and five in 2020. When probable cases (that is those with only a single positive serology result) were included in the count, levels increased to be similar to those recorded in 2011 to 2014. As a result of this and to allow for some reporting to occur, for the years 2011 to 2015 valid cases alone are presented (there were no probable cases over this period) and for 2016 to 2020 valid plus probable cases are presented. Age specific rates for 2018 to 2020 are also calculated using combined valid plus probable cases.

There were 299 notifications (valid + probable) of Ross River virus on average per year among MSH residents during the period 2018 to 2020. The age standardised notification rate in MSH was 25 per 100,000 population, which was significantly lower (43% lower) than the rate in the rest of Queensland (50 per 100,000) (Appendix 1: Table 16).

Ross River virus age specific rates increased through the child and teenage years, peaking in the middle years of life and then declining with increasing age (Figure 42).

The number of Ross River virus notifications in MSH was relatively stable between 2011 and 2019 with around 200 notifications per year. The exception was 2015 when a major outbreak was recorded across MSH and the rest of Queensland (Figure 43). The causes of this outbreak remain unclear.

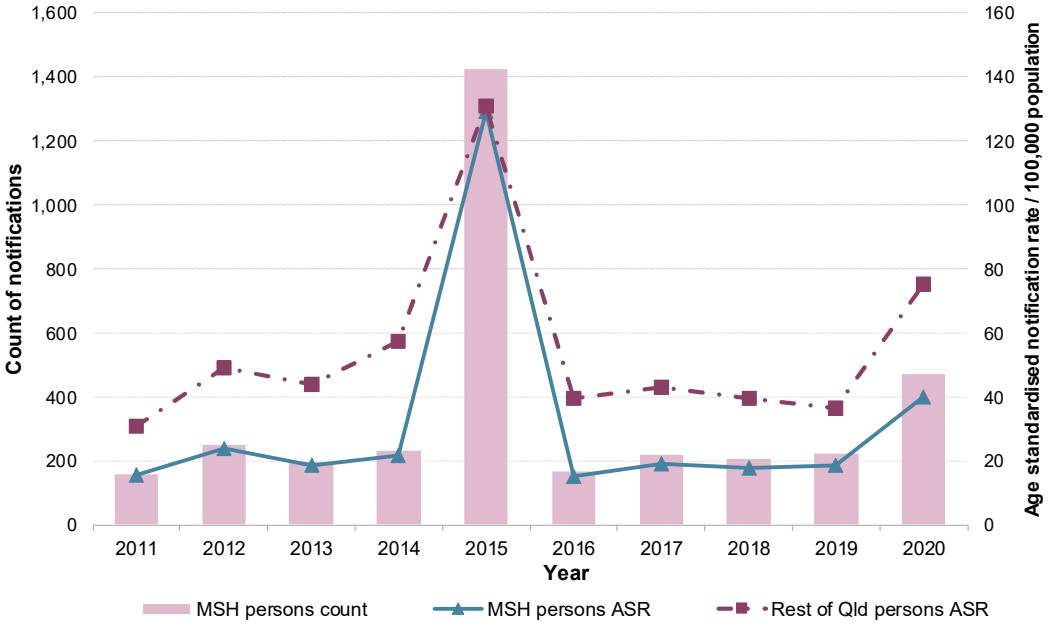
Both notification rate and count more than doubled from 2019 to 2020 in MSH and the rest of Queensland.



* rates not presented for <10 years age group because of low count

^ includes valid and probable notifications

Figure 42: Ross River virus age specific notification rates, Metro South Health and rest of Queensland, 2018 to 2020 (with 95% confidence intervals) *^



^ includes valid and probable notifications

Figure 43: Ross River virus notification counts (Metro South Health) and all persons age standardised notification rates (Metro South Health and rest of Queensland), 2011 to 2020^

Impact of COVID-19 pandemic

While both the annual count and rate of notifications of Ross River virus more than doubled in MSH and the rest of Queensland, it is not possible to establish whether there was a causal link between the observed increase and the COVID-19 pandemic. It could be hypothesised that the inability of Queenslanders to travel overseas for holidays in most of 2020 led to increased local tourism and local outdoor activities with a consequent increase in exposure to mosquitos, however this is purely speculative.

Barmah Forest virus

Key findings 2018 to 2020:

- average of 25 notifications per year in MSH residents
- annual numbers of notifications too low for accurate age standardised notification rates to be calculated for MSH
- majority of notifications in persons aged 20 to 69 years
- notification rate and count almost doubled to 2020; unclear if increase linked to COVID-19 pandemic

Only data pre- and post-2013 can be usefully analysed for Barmah Forest virus. In late 2012 and through much of 2013 a problem occurred with Barmah Forest virus test kits which resulted in a relatively large number of false positive test results and hence an erroneously high number of notifications were recorded. Notifications data for 2013, 2014, 2015 and most of 2012 are considered to be reliable, but 2011 and 2012 data should still be interpreted with some caution. As a result, data for 2011 and 2012 are not presented in this report.

Similar to Ross River virus, from the start of 2016 the national surveillance case definition for Barmah Forest virus infection was updated so that a single positive serology result would no longer meet the case definition for infection, thereby reducing the likelihood of false positive notifications. As a result of this change, data on valid notifications from pre-2016 cannot be compared or combined with that from 2016 or later years. Owing to this and the erroneous 2013 data, only limited analysis of Barmah Forest virus notifications is possible.

The case definition change resulted in fewer than five valid cases of Barmah Forest virus being recorded in MSH between 2016 and 2020 and fewer than five valid cases in the rest of Queensland for the same period. When probable cases were included, this increased to 110 notifications in MSH over the same five-year period. To allow for reporting and avoid any inaccuracy in the interpretation of Barmah Forest virus notifications, data are presented as a three-year average (2018 to 2020) of both valid and probable cases; age specific rates are also calculated on valid plus probable cases combined.

During 2018 to 2020 on average there were 25 notifications (almost all probable) of Barmah Forest virus per year among MSH residents. Because of the low number of notifications, accurate age standardised, and age specific rates could not be calculated for MSH. The age standardised notification rate for Queensland was 5.1 per 100,000 population. (Appendix 1: Table 17).

Barmah Forest virus age specific rates for Queensland (2018 to 2020) followed a similar pattern to Ross River virus rates, with an increase through adolescent and young adult years, a peak in the middle years of life and a decline with increasing age. Patterns of age distribution were not able to be determined in MSH where in 2018 to 2020 there was an annual average of fewer than five notifications in most ten-year age groups from 10 years upwards and no (zero) notifications in persons under 10 years of age. (data not shown).

The number of Barmah Forest virus notifications in MSH dropped substantially in 2016 (the year of the change in national surveillance definition) and then remained very stable between 2016 and 2019 with just under 20 notifications per year (Figure 44). In 2020 the number of notifications and the rate in MSH almost doubled, while in the rest of Queensland the notification rate tripled.

Figure 44: Barmah Forest virus notification counts (Metro South Health) and all persons age standardised notification rates (Metro South Health and rest of Queensland), 2014 to 2020

Impact of COVID-19 pandemic

While both the annual count and rate of notifications of Barmah Forest virus almost doubled in MSH and tripled in the rest of Queensland, it is not possible to establish whether there was a causal link between the observed increase and the COVID-19 pandemic..

Other diseases

Meningococcal disease

Key findings 2018 to 2020:

- average of eight notifications per year in MSH residents; 47 in all of Queensland
- annual numbers of notifications too low for accurate age standardised notification rates to be calculated for MSH
- numbers of notifications were highest in persons under 30 years of age
- no evidence of any impact from COVID-19 pandemic

Meningococcal disease is a severe but uncommon infection caused by *Neisseria meningitidis* bacteria invading the blood stream from the throat or nose. Approximately 10% of the population are silent carriers, able to spread the disease to others while remaining asymptomatic. Invasive meningococcal disease most commonly presents as septicaemia (when the bacteria invade the bloodstream) and/or meningitis (when the bacteria infect the lining around the brain and spinal cord).

Urgent contact tracing is carried out when a public health unit receives notifications of probable or confirmed cases, with specific clearance antibiotics being recommended for defined, selected close household-like contacts of cases. Vaccination is also recommended for selected close contacts of people infected with certain serogroups of meningococcal disease which are preventable through vaccination[12].

On average there were eight notifications of meningococcal disease per year among MSH residents and 47 per year in all of Queensland during the period 2018 to 2020. Because of the low number of notifications of meningococcal disease, accurate age standardised, and age specific rates could not be calculated for MSH or Queensland

In both MSH and Queensland the more than half of all notifications were in the birth to 29 years age group. In Queensland for 2018 to 2020, the peak five-year age groups for notifications were birth to four years (24% of all notifications) and 15 to 19 years (16% of all notifications). In MSH the peaks were seen in the same age groups with 13% of all notifications in the birth to four years group and 25% of notifications in those aged 15 to 19 years (data not shown).

Between 2011 and 2020 counts of meningococcal disease notifications in Queensland showed no consistent trend while in MSH annual notifications ranged from fewer than five in 2014 to 14 in 2018 (Figure 45). Following the 2018 peak counts again decreased to fewer than five in 2020 (Figure 45).

There are multiple strains or serogroups of meningococcal disease. Some serogroups can be prevented by vaccination. Vaccines for serogroup B are available on the private market but are not currently part of the National Immunisation Program (NIP)[15]. Meningococcal B comprises the largest proportion of all reported cases of meningococcal disease in Queensland, although this has declined from >75% of all

reported cases (2011 to 2014) to less than half of all reported cases (2015 to 2019). In 2020 the proportion of serogroup B notifications increased again to 61%.

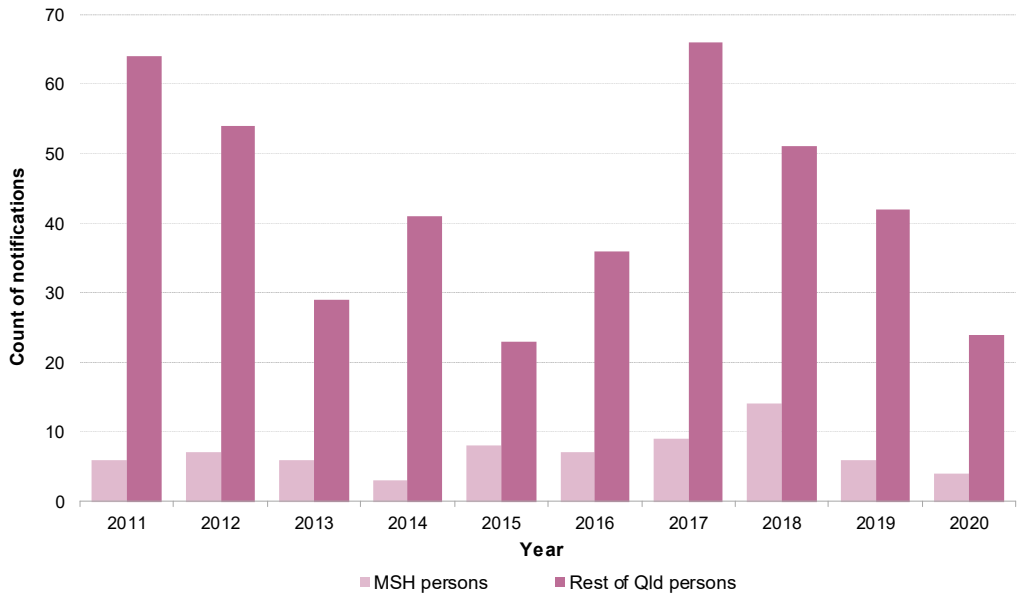


Figure 45: Meningococcal disease annual counts of notifications, all persons, Metro South Health and rest of Queensland, 2011 to 2020

Both meningococcal W disease and meningococcal Y disease notifications increased markedly in Queensland between 2015 and 2017. Immunisation against serogroups A, C, W and Y is recommended as part of the NIP at 12 months of age. In response to the rise in serogroups W and Y disease in 2016, a meningococcal ACWY vaccination program was introduced in July 2017 to provide vaccination to Year 10 students through the school immunisation program and catch-up vaccination for young people aged 15 to 19 years through their GP or regular immunisation provider[15].

Following the introduction of the ACWY vaccination, serogroups W and Y each showed a decrease in notifications in Queensland with the decrease centred in age groups 25 years and over. Prior to 2016 serogroup B represented over 60% of all Queensland meningococcal disease notifications each year. Between 2016 and 2019 this dropped to 50% or lower annually (data not shown). In 2020 (data available to Sept only) serogroup B rose to 62% of Queensland notifications. The increase in the proportion of serogroup B combined with the drop in serogroups W and Y may reflect the impact of the ACWY vaccination program in the state.

Impact of COVID-19 pandemic

The annual count of meningococcal disease notifications declined in 2020 in both MSH and Queensland. However these declines were to levels observed in other years in the previous ten year period. Given this and the absence of any clear trends prior to 2020 there is no conclusive evidence of a COVID-19 pandemic impact on meningococcal disease notifications in MSH.

Legionellosis

Key findings 2018 to 2020:

- average 15 notifications per year in MSH residents; 63 in all of Queensland
- annual numbers too small for accurate age standardised rates to be calculated for MSH
- numbers of notifications were highest in adults 50 years and over
- no evidence of any impact from COVID-19 pandemic

Legionellosis is a collective term for lung infections caused by *Legionella* bacteria. The severity of legionellosis can range from a mild self-limiting flu-like illness to potentially life-threatening pneumonia requiring treatment (Legionnaires' disease). *Legionella* bacteria are found naturally in the environment particularly in freshwater environments and soil, however very few people develop illness. Legionellosis is rare in individuals under 20 years of age, but people at high risk of serious illness include smokers over 50 years of age and those with weakened immune systems.

There are various types of *Legionella* bacteria. In Australia, the most common species to cause human disease include *Legionella pneumophila* (most commonly associated with water systems such as air-conditioning cooling towers with high levels of *Legionella* bacteria) and *Legionella longbeachae* (often associated with potting mix and other gardening soils)[13].

Public health action for legionellosis includes search for common sources of exposure to enable clearing of *Legionella* bacteria. Appropriate regular maintenance of cooling towers and hot water systems helps to prevent growth of *Legionella* and wearing a face mask helps to reduce risk from *Legionella longbeachae* when handling potting mix[12,13].

On average there were 15 notifications of legionellosis per year among MSH residents and 63 in all of Queensland during the period 2018 to 2020. Because of the low number of notifications of legionellosis, accurate age standardised, and age specific rates could not be calculated for MSH. The age standardised notification rate for legionellosis in Queensland was 1.1 per 100,000 population.

In both MSH and Queensland, most notifications (over 80% of all notifications) were in those aged 50 years and over.

Between 2009 and 2018 legionellosis notifications ranged between 25 and 40 annually in the rest of Queensland. The year 2013, with an annual total of 63 was a clear exception to the usual pattern. The 2013 spike likely reflects an increase in awareness, testing and notifications to Public Health Units following publicity at that time. MSH recorded a relatively small increase in notifications in 2013 in comparison with the rest of Queensland. Over the ten-year reporting period there were fewer than ten notifications in most years in MSH but 2013 saw a total of 19 cases. In 2016 MSH was notable for having almost no cases recorded (Figure 46).

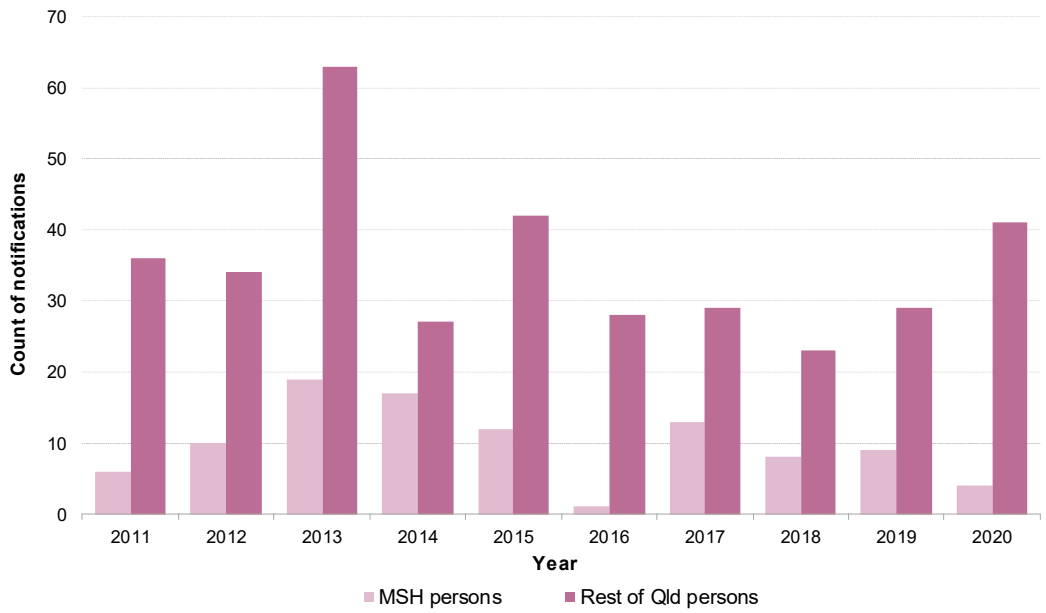


Figure 46: Legionellosis annual counts of notifications, all persons, Metro South Health and rest of Queensland, 2011 to 2020

Impact of COVID-19 pandemic

The annual count of legionella notifications declined in 2020 in MSH but increased in the rest of Queensland. Despite the decline in MSH, counts remained at a level typical for the previous ten-year period (Figure 46). Given this and the absence of any decline in the rest of Queensland there is no evidence of a COVID-19 pandemic impact on legionella notifications in MSH or the rest of Queensland.

Rabies virus – potential exposure

Key findings 2018 to 2020:

- average 83 episodes of potential exposure to rabies virus per year among MSH residents at an age standardised notification rate of 6.9 per 100,000 population which was similar to the rate in the rest of Queensland
- cases of potential exposure most common among those aged 20 to 29 years
- COVID-19 pandemic resulted in a substantial drop in potential rabies exposure notifications

Rabies, a serious and usually fatal disease in humans, is caused by classical rabies virus and other lyssaviruses, including Australian bat lyssavirus (ABLV) (see next section). Australia is one of the few countries in the world free of terrestrial rabies.

The virus is transmitted to humans when saliva from an infected animal enters the body, usually via a bite or scratch but also by licks to the eyes, nose, mouth or on a pre-existing skin break. Public health action for potential rabies virus exposure includes urgent assessment and vaccination as indicated, coordinated through Public Health Units[12,13]. Given that Australia is free of the virus, all exposures occur in overseas countries and are frequently treated upon return to Australia.

On average there were 83 notified episodes of potential exposure to rabies virus per year among MSH residents during 2018 to 2020. The age standardised notification rate was 6.9 per 100,000 population which was statistically similar to the rate in the rest of Queensland (5.4 per 100,000). Cases were most common among those aged 20 to 29 years (34% of MSH and rest of Queensland notifications) (Appendix 1: Table 18).

The number of notifications of potential exposure to rabies virus has increased substantially across both MSH and the rest of Queensland since records commenced in 2009 (Figure 47). In MSH the number of notifications in 2019 was ten times higher than the number recorded in 2011 while in the rest of Queensland it was 2.5 times higher (Figure 47). In 2020 the number of potential exposures decreased substantially as international travel was limited by the COVID-19 pandemic thereby restricting the potential for exposure to the virus.

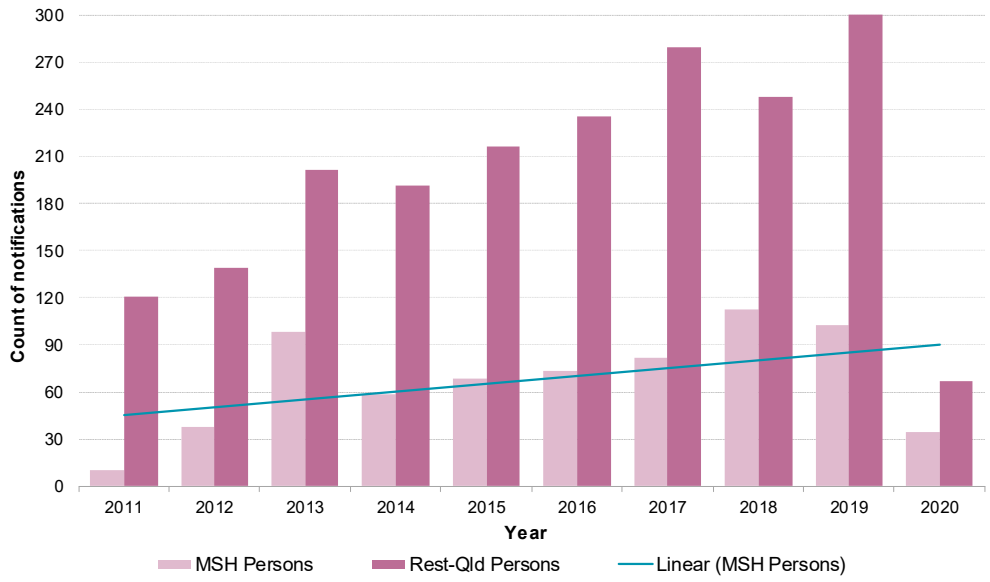


Figure 47: Potential rabies exposure annual counts of notifications, all persons, Metro South Health and rest of Queensland, 2011 to 2020 with linear trendline for MSH

Impact of COVID-19 pandemic

Unsurprisingly the annual count of potential rabies exposure notifications declined substantially in 2020 in MSH and the rest of Queensland. The closure of the Australian borders due to the COVID-19 pandemic and the almost complete cessation of overseas tourism travel resulted in a major drop in rabies exposures which all occur overseas.

Australian bat lyssavirus – potential exposure

Key findings 2018 to 2020:

- average 75 episodes of potential exposure to ABLV per year among MSH residents, at an age standardised notification rate of 6.3 per 100,000 population which was similar to the rate in the rest of Queensland
- cases of potential exposure most common among those aged 20 to 29 years
- early 2013 the third ever person died from ABLV in Queensland with subsequent publicity leading to an increase in awareness and notifications of potential exposures
- COVID-19 pandemic resulted in no change in potential ABLV exposure notifications

Australian bat lyssavirus (ABLV) is found in Australian bats and flying foxes and potentially any Australian bat could carry the virus. The virus is transmitted to humans when saliva from an infected bat enters the body, usually via a bite or scratch. Bat behaviour or appearance is not a reliable indicator of ABLV carriage. Any individual who is bitten or scratched by a bat or flying fox or gets bat saliva in the eyes, nose or mouth or on a pre-existing skin break is treated as a potential exposure to ABLV. Public health action for potential ABLV exposure includes urgent assessment and vaccination as indicated, coordinated through Public Health Units[12,13].

Only three cases of human infection with Australian bat lyssavirus have been recorded in Australia, all in Queensland: two were recorded in the 1990s and one in 2013. All three cases died from the infection.

On average there were 75 episodes of potential ABLV exposure per year among MSH residents during the period 2018 to 2020. The age standardised notification rate was 6.3 per 100,000 population which was statistically similar to the rate in the rest of Queensland (8.0 per 100,000). Cases were spread throughout all age groups but were most common among people aged 20 to 59 years (76% of MSH notifications) with 21% of notifications in persons aged 20 to 29 years (Appendix 1: Table 19).

The number of notifications of potential exposure to ABLV increased across MSH and the rest of Queensland following the commencement of records in 2009 (Figure 48; some data not shown). A significant peak in notifications of potential exposure to ABLV (and to a lesser extent overseas rabies virus) was seen in 2013 with a total of 98 episodes of potential exposure recorded among MSH residents and 445 episodes across the rest of Queensland. This increase followed widespread publicity relating to the third confirmed human case of death due to ABLV.

The 2013 spike in notifications reflected increased awareness of interactions with bats across the state among both the public and medical practitioners. In many cases notifications were in relation to potential exposures that occurred in the past, which still required at times complicated individualised risk assessment regarding the need for post exposure prophylaxis.

Following the 2013 peak, notifications in MSH showed a noticeable decline to just 23 in 2015 (Figure 48). However, since 2015 annual numbers have risen steadily to a total of 111 in 2019. By comparison, numbers in the rest of Queensland remained relatively steady between 2014 and 2018 at around 250 per year (Figure 48).

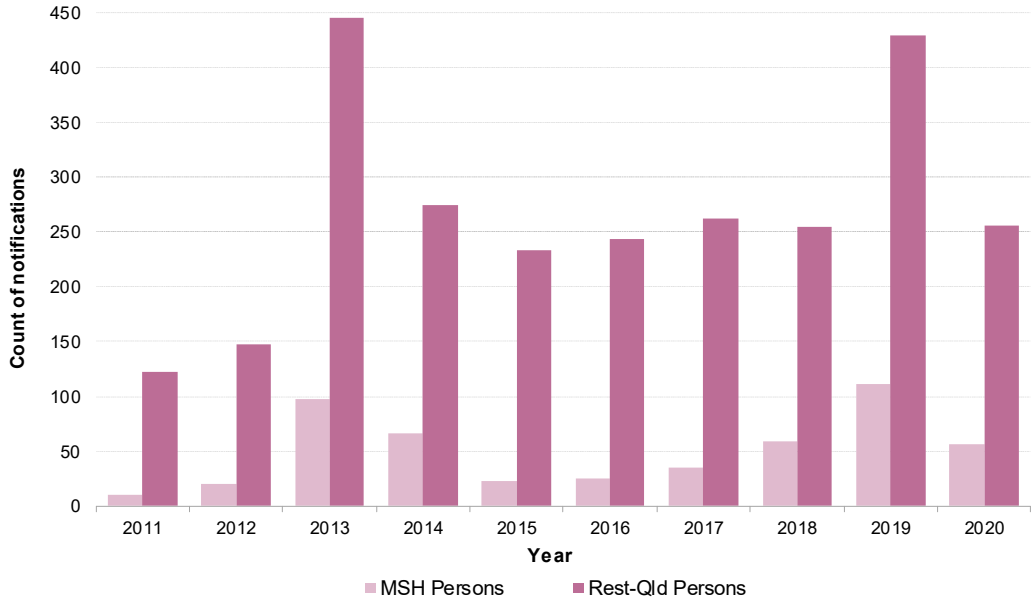


Figure 48: Potential ABLV exposure annual counts of notifications, all persons, Metro South Health and rest of Queensland, 2011 to 2020

In 2019 a second major spike in notifications occurred in both MSH and the rest of Queensland. The count in MSH was even higher than that recorded in 2013. The cause of this sharp increase is uncertain although high summer temperatures were stated to have caused distress to bat populations with media reports of bats falling from trees. An increase in distressed bats may have led to an increase in members of the general public attempting to provide them with assistance and consequently being scratched and/or bitten.

Information was available for combined Metro South and West Moreton Hospital and Health Service areas for 505 potential exposures to Australian Bat Lyssavirus between 2006 and 2015. The most common exposures (49%) were intentional handling by community members (average of 24 per year), a further 22% were bat-initiated contact of community members (average of 11 per year) while 8% occurred in voluntary animal handlers (average four per year).

Impact of COVID-19 pandemic

The annual number of potential ABLV notifications in 2020 declined from the peak of 2019 to a level in the rest of Queensland which was typical of the period 2014 to 2018. In MSH the 2020 count was almost the same as that recorded in 2018. There is no evidence of a COVID-19 pandemic impact on potential ABLV exposure notifications in MSH or the rest of Queensland.

Q fever

Key findings 2018 to 2020:

- average 23 notifications per year among MSH residents; 221 in all of Queensland
- annual numbers too small for accurate age standardised rates to be calculated for MSH
- notifications most common in persons aged between 40 and 69 years
- no evidence of any impact from COVID-19 pandemic

Q fever is caused by inhaling *Coxiella burnetii* bacteria, usually while in contact with infected animals, animal tissues, or animal products. The main carriers of the disease include cattle, sheep, goats, and kangaroos (as well as a range of other animals). The bacteria can survive harsh conditions and remain in the environment for long periods. They are spread through dust, hay and other small particles. Apart from an acute febrile illness with fatigue and joint/muscle pains, Q fever can cause chronic disease (chronic fatigue, endocarditis). Public health action for Q fever includes vaccination for those who are occupationally at risk of the disease, as well as use of appropriate protective equipment and steps to minimise transmission[12].

On average there were 23 notifications of Q fever per year among MSH residents and 221 in all of Queensland during the period 2018 to 2020. Because of the low number of notifications of Q fever, accurate age standardised, and age specific rates could not be calculated for MSH. The age standardised notification rate for Q fever in Queensland was 4.2 per 100,000 population (data not shown).

Q Fever notifications were most common in people aged 40 to 69 years, with this age group accounting for 57% of all MSH notifications and 63% of all notifications in the rest of Queensland (data not shown).

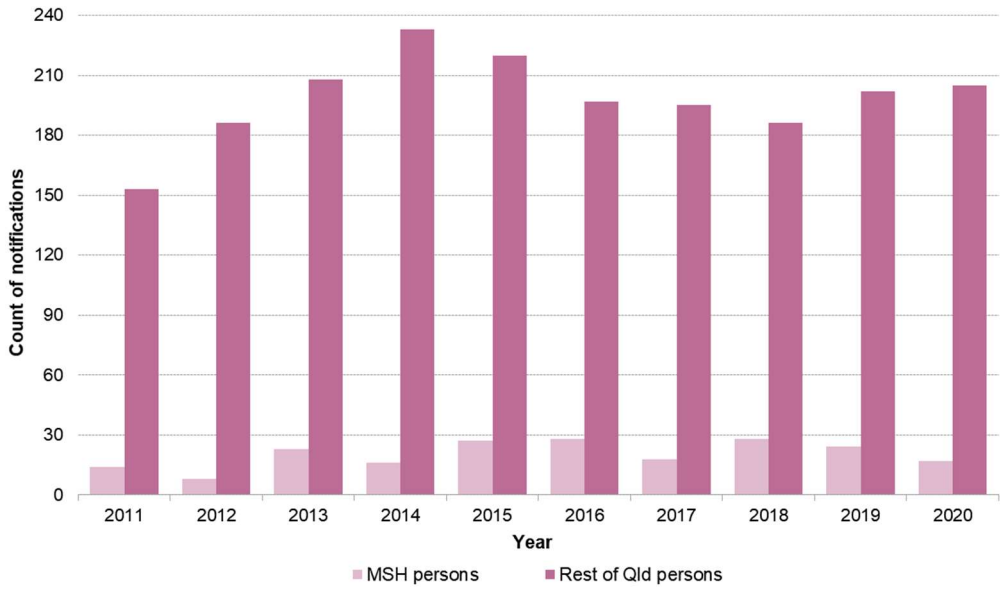


Figure 49: Q fever annual counts of notifications for all persons, Metro South Health and rest of Queensland, 2011 to 2020

Annual counts of Q fever notifications in the rest of Queensland increased substantially between 2009 and 2014 before decreasing again and showing no particular pattern (Figure 49, some data not shown). Counts were low in MSH, ranging between eight and 28 per year from 2011 to 2020 and showing no consistent trends (Figure 49).

Impact of COVID-19 pandemic

There is no evidence of a COVID-19 pandemic impact on Q fever notifications in MSH or the rest of Queensland. While the number of Q fever notifications in MSH did decline in 2020, this was most likely the result of usual year-to-year variation, especially given there was no corresponding decline recorded in the rest of Queensland.

Tuberculosis

Key findings 2018 to 2020:

- average of 60 notifications of tuberculous per year among MSH residents, 155 in all of Queensland
- age standardised rate of 4.9 per 100,000 was significantly higher than rest of Queensland rate
- notifications more common in the 20 to 39 year age groups (54% of MSH notifications)
- annual counts increasing in MSH
- no evidence of any impact from COVID-19 pandemic

Tuberculosis (TB) is a bacterial infection that can affect almost any part of the body but most commonly the lungs. TB can be cured by appropriate medications but can be a very serious disease if not diagnosed and treated. Antibiotic resistance presents an increasing problem for treatment. Public health action for TB includes arranging appropriate testing and treatment as well as contact tracing and at times lengthy follow-up. In Queensland this is carried out through specific TB treatment centres with overall coordination by the Metro South Clinical Tuberculosis Service[12,13].

There were 60 notifications of TB on average per year among MSH residents during 2018 to 2020. The age standardised notification rate was 4.9 per 100,000 population, which was significantly higher (63% higher) than the rate for rest of Queensland (2.5 per 100,000).

The low number of notifications precluded meaningful comparison of age or sex specific rates, however, counts and rates were highest among adults in the 20 to 39 year age groups in both MSH and the rest of Queensland (54% of MSH notifications; Appendix 1: Table 20) and rates were similar for males and females (data not shown).

Over the ten-year reporting period, the annual number of TB notifications in MSH showed an upwards trend from fewer than 50 to 68 in 2020. The rest of Queensland did not experienced a similar trend with notification counts varying generally in the range of 85 to 105 per year over the same period (Figure 50).

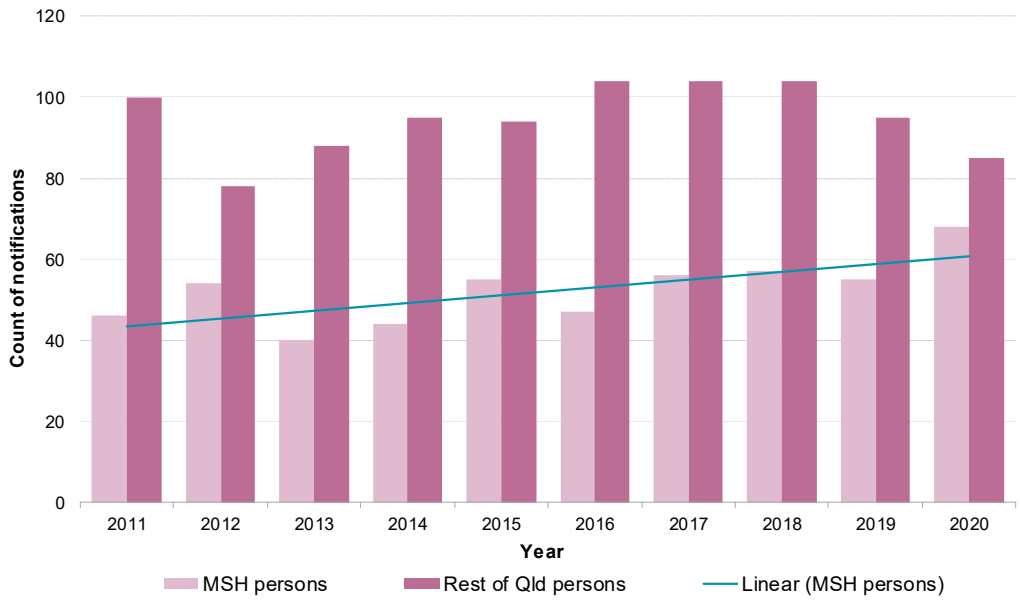


Figure 50: Tuberculosis annual counts of notifications, all persons, Metro South Health and rest of Queensland, 2011 to 2020

Impact of COVID-19 pandemic

There is no evidence of a COVID-19 pandemic impact on TB notifications in MSH or the rest of Queensland. While the number of Q fever notifications in MSH rose in 2020, this was part of a general upwards trend and at the same time there was a decline recorded in the rest of Queensland.

Definitions

Age specific rate: A rate reported for a specific age group. Age specific rates are calculated by dividing the number of events (e.g. deaths) occurring in a specific age group by the corresponding population in the same age group.

Age standardisation: A method used to convert the age structures of different populations to the same 'standard' structure. If there is a greater proportion of older people in a Hospital and Health Service area compared with the Queensland average, then we would expect the crude rates of many diseases associated with ageing to be higher in that Hospital and Health Service. Standardisation allows comparison of disease rates between populations by removing the influence of age.

Confidence intervals: Usually expressed as 95% CI, this means we can be 95% confident that the true value of interest lies within the confidence intervals given. We do not usually know what the true value is as we can only estimate it from observations taken from samples. For example, if the mortality rate is 3.1 per 100,000 (95% CI: 2.9-3.2), we can be 95% confident that the true rate will be between 2.9 and 3.2, and our best estimate is 3.1 per 100,000.

Crude rates: A crude rate is the number of events (deaths, hospitalisations, new cancer cases) from a specific cause over a specified period of time (usually per year) divided by the total population. For example, a crude hospital separation rate is defined as the number of persons who completed an episode of hospital care within a specified time divided by the total population.

Estimated resident populations (ERPs): These are the official estimates of the Australian population, which link people to a place of usual residence within Australia. The Australian Bureau of Statistics defines 'usual residence' as the place where each person has lived or intends to live for six months or more from the reference date for data collection.

Incidence: A measure of the risk of developing a disease or condition within a specified period of time. Incidence refers to new cases of disease occurring within a specified time period divided by the population at risk. For example, if a population initially contains 100,000 non-diseased persons and 1000 get the disease in a year, the incidence rate is 1,000 per 100,000 in that year (1%).

Prevalence: Prevalence is the proportion of a population that has a disease or condition at a given point in time. It is usually expressed as a percentage where the number of events is the numerator and the population at risk is the denominator. Therefore if 10,000 people have diabetes in a total population at risk of 100,000, then the prevalence of diabetes in that population at that time is 1 in 10, or 10%.

P value: By convention, a P value of 0.05 or less is usually considered 'statistically significant'. That is, if the P value is less than 0.05, there is a less than one in 20 chance that the observed difference would have arisen by chance alone. When comparing rates between a Hospital and Health Service area and Queensland, if the P value is <0.01, this is often referred to 'highly significant' because the probability that the observed difference is due to chance alone is less than one in 100.

Relative risk: The ratio of the probability of an event occurring (death, disease) among those exposed to a risk factor compared with those not exposed. It is calculated by dividing the incidence rate in the exposed group by the incidence rate in the non-exposed group. A relative risk of 1.0 means there is no difference in risk between the two groups.

Statistical significance: A statistical test that provides us with information on whether an observed difference or association may be real or 'significant' and is unlikely to be due to chance alone (See P value). However, it is important to note that statistical significance does not necessarily mean that an observed effect or difference is real, because by chance alone one in 20 'significant' findings will be spurious (where P=0.05). Also 'statistical significance' does not necessarily mean clinically significant. It is the size of the effect that determines the clinical or public health importance, not the presence of statistical significance alone.

List of Figures

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Appendix 1

Table 1. COVID-19 annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland, 2020, with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	9 (5.7)	19 (2.9)	2.83 (1.20 - 6.70)	↑
10-19	13 (8.6)	47 (7.2)	1.27 (0.67 - 2.40)	—
20-29	70 (38.1)	259 (36.3)	1.07 (0.81 - 1.40)	—
30-39	54 (30.1)	198 (28.3)	1.09 (0.79 - 1.48)	—
40-49	56 (35.3)	176 (26.3)	1.50 (1.09 - 2.05)	↑
50-59	40 (28.9)	165 (26.3)	1.13 (0.79 - 1.62)	—
60-69	40 (37.0)	186 (35.3)	1.06 (0.75 - 1.50)	—
70+	21 (19.6)	135 (24.5)	0.76 (0.48 - 1.21)	—
Total	303 (25.0)	1,185 (22.7)	1.14 (1.00 - 1.30)	—

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 2. Pertussis average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	55 (34.7)	514 (78.6)	0.37 (0.29 - 0.49)	↓
10-19	42 (27.6)	347 (53.1)	0.45 (0.33 - 0.62)	↓
20-29	15 (8.0)	81 (11.4)	0.63 (0.36 - 1.11)	—
30-39	17 (9.3)	94 (13.4)	0.62 (0.37 - 1.05)	—
40-49	14 (9.0)	114 (17.0)	0.46 (0.27 - 0.80)	↓
50-59	15 (10.8)	83 (13.3)	0.78 (0.44 - 1.36)	—
60-69	9 (8.6)	57 (10.9)	0.75 (0.37 - 1.51)	—
70+	<5 (#)	44 (8.0)	#	—
Total	171 (14.7)	1,345 (27.4)	0.47 (0.41 - 0.55)	↓

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 3. Influenza average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	1,392 (882.4)	6,338 (969.3)	0.89 (0.83 - 0.94)	↓
10-19	958 (634.1)	4,245 (649.7)	0.97 (0.90 - 1.04)	—
20-29	792 (431.3)	3,442 (482.5)	0.86 (0.80 - 0.93)	↓
30-39	914 (508.7)	3,793 (542.2)	0.92 (0.85 - 0.99)	↓
40-49	683 (430.2)	2,965 (443.6)	0.96 (0.88 - 1.05)	—
50-59	625 (451.7)	2,815 (448.4)	1.01 (0.92 - 1.10)	—
60-69	557 (514.2)	2,599 (492.8)	1.06 (0.96 - 1.16)	—
70+	789 (735.6)	3,720 (675.1)	1.11 (1.03 - 1.20)	↑
Total	6,710 (568.3)	29,916 (589.0)	0.95 (0.93 - 0.98)	↓

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 4. Pneumococcal disease average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	15 (9.7)	60 (9.1)	1.09 (0.61 - 1.94)	—
10-19	<5 (#)	11 (1.6)	#	#
20-29	<5 (#)	19 (2.7)	#	#
30-39	6 (3.3)	25 (3.6)	0.90 (0.36 - 2.24)	—
40-49	6 (3.6)	34 (5.0)	0.65 (0.27 - 1.59)	—
50-59	7 (4.8)	39 (6.3)	0.72 (0.31 - 1.65)	—
60-69	10 (9.2)	50 (9.4)	0.98 (0.49 - 1.95)	—
70+	19 (17.4)	76 (13.7)	1.36 (0.81 - 2.28)	—
Total	67 (5.5)	313 (5.8)	0.92 (0.70 - 1.22)	—

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 5. Varicella average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	249 (157.6)	779 (119.1)	1.47 (1.27 - 1.71)	↑
10-19	191 (126.1)	752 (115.1)	1.13 (0.96 - 1.33)	—
20-29	267 (145.5)	969 (135.8)	1.10 (0.95 - 1.27)	—
30-39	338 (187.9)	1,206 (172.4)	1.13 (0.99 - 1.28)	—
40-49	301 (189.7)	1,155 (172.8)	1.13 (0.99 - 1.29)	—
50-59	370 (267.4)	1,522 (242.5)	1.14 (1.01 - 1.28)	↑
60-69	415 (383.4)	1,748 (331.5)	1.21 (1.08 - 1.35)	↑
70+	330 (307.8)	1,669 (302.9)	1.02 (0.91 - 1.15)	—
Total	2,460 (204.3)	9,799 (183.8)	1.15 (1.10 - 1.20)	↑

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 6. Salmonellosis average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland **

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	239 (151.3)	1,314 (201.0)	0.70 (0.61 - 0.80)	↓
10-19	62 (40.8)	292 (44.7)	0.89 (0.67 - 1.18)	—
20-29	91 (49.5)	413 (57.9)	0.81 (0.65 - 1.03)	—
30-39	92 (51.2)	370 (52.8)	0.96 (0.76 - 1.21)	—
40-49	69 (43.3)	311 (46.6)	0.91 (0.70 - 1.19)	—
50-59	60 (43.6)	347 (55.2)	0.75 (0.57 - 0.98)	↓
60-69	55 (50.8)	318 (60.3)	0.81 (0.61 - 1.08)	—
70+	70 (65.3)	420 (76.3)	0.83 (0.64 - 1.07)	—
Total	737 (62.1)	3,786 (74.8)	0.79 (0.73 - 0.85)	↓

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 7. *Campylobacter* average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	261 (165.7)	1,206 (184.4)	0.87 (0.76 - 1.00)	—
10-19	157 (104.1)	695 (106.4)	0.97 (0.81 - 1.16)	—
20-29	271 (147.5)	1,180 (165.4)	0.86 (0.75 - 0.98)	🡻
30-39	264 (146.8)	1,052 (150.4)	0.97 (0.84 - 1.11)	—
40-49	238 (149.8)	1,020 (152.7)	0.98 (0.84 - 1.13)	—
50-59	226 (163.6)	1,048 (167.0)	0.97 (0.84 - 1.13)	—
60-69	207 (190.9)	964 (182.8)	1.06 (0.91 - 1.23)	—
70+	245 (228.2)	1,193 (216.4)	1.07 (0.93 - 1.23)	—
Total	1,869 (156.7)	8,357 (161.8)	0.96 (0.91 - 1.01)	—

* 🡹 MSH statistically significantly higher than rest of Queensland; 🡻 MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 8. Rotavirus average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	126 (79.7)	474 (72.5)	1.13 (0.93 - 1.39)	—
10-19	15 (10.1)	61 (9.3)	1.12 (0.63 - 2.00)	—
20-29	23 (12.5)	77 (10.8)	1.22 (0.75 - 1.99)	—
30-39	24 (13.4)	89 (12.7)	1.07 (0.67 - 1.71)	—
40-49	15 (9.5)	53 (7.9)	1.28 (0.70 - 2.32)	—
50-59	15 (10.8)	64 (10.2)	1.08 (0.61 - 1.93)	—
60-69	19 (17.9)	84 (15.9)	1.16 (0.70 - 1.92)	—
70+	43 (40.1)	144 (26.1)	1.77 (1.24 - 2.52)	🡹
Total	280 (23.6)	1,045 (20.6)	1.20 (1.04 - 1.37)	🡹

* 🡹 MSH statistically significantly higher than rest of Queensland; 🡻 MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 9. Cryptosporidiosis average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	33 (21.1)	331 (50.6)	0.35 (0.25 - 0.50)	↓
10-19	10 (6.8)	50 (7.6)	0.87 (0.44 - 1.73)	—
20-29	23 (12.7)	119 (16.7)	0.70 (0.45 - 1.10)	—
30-39	29 (16.3)	171 (24.4)	0.60 (0.40 - 0.89)	—
40-49	12 (7.6)	59 (8.9)	0.81 (0.43 - 1.53)	—
50-59	5 (3.9)	34 (5.4)	0.66 (0.26 - 1.65)	—
60-69	6 (5.2)	32 (6.1)	0.83 (0.34 - 2.06)	—
70+	<5 (#)	22 (3.9)	#	—
Total	123 (10.3)	818 (16.8)	0.55 (0.45 - 0.66)	↓

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland; — no statistically significant difference between MSH and rest of Queensland

Age group count of fewer than 5 too low for accurate rate calculation

** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 10. Chlamydia average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	7 (4.6)	31 (4.7)	0.97 (0.43 - 2.23)	—
10-19	923 (610.9)	4,984 (762.9)	0.76 (0.70 - 0.81)	↓
20-29	2,757 (1,500.9)	12,862 (1,803.2)	0.79 (0.75 - 0.82)	↓
30-39	889 (494.6)	3,697 (528.4)	0.92 (0.85 - 0.99)	↓
40-49	264 (166.1)	1,243 (186.0)	0.86 (0.75 - 0.99)	↓
50-59	99 (71.8)	463 (73.8)	0.97 (0.77 - 1.20)	—
60-69	34 (31.4)	154 (29.3)	1.09 (0.75 - 1.60)	—
70+	7 (6.5)	33 (5.9)	1.13 (0.49 - 2.60)	—
Total	4,980 (407.6)	23,467 (480.9)	0.81 (0.78 - 0.83)	↓

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland — no statistically significant difference between MSH and rest of Queensland

Age group count of fewer than 5 too low for accurate rate calculation

** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 11. Gonorrhoea average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	<5 (#)	<5 (#)	#	#
10-19	117 (77.4)	631 (96.6)	0.76 (0.62 - 0.92)	🡻
20-29	601 (327.2)	2,478 (347.5)	0.92 (0.84 - 1.01)	—
30-39	395 (219.7)	1,554 (222.1)	0.99 (0.88 - 1.10)	—
40-49	163 (102.5)	643 (96.2)	1.09 (0.91 - 1.30)	—
50-59	47 (34.2)	252 (40.1)	0.82 (0.60 - 1.12)	—
60-69	16 (14.5)	76 (14.3)	1.01 (0.58 - 1.76)	—
70+	<5 (#)	12 (2.1)	#	#
Total	1,340 (110.5)	5,648 (116.6)	0.93 (0.88 - 0.99)	🡻

* 🡹 MSH statistically significantly higher than rest of Queensland; 🡻 MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 12. Syphilis (infectious) average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	<5 (#)	<5 (#)	#	#
10-19	8 (5.3)	72 (11.0)	0.42 (0.20 - 0.85)	🡻
20-29	60 (32.8)	305 (42.8)	0.71 (0.54 - 0.94)	🡻
30-39	59 (32.8)	264 (37.7)	0.83 (0.62 - 1.11)	—
40-49	36 (22.7)	154 (23.0)	0.98 (0.68 - 1.43)	—
50-59	21 (14.9)	94 (14.9)	1.00 (0.61 - 1.63)	—
60-69	6 (5.9)	30 (5.6)	1.05 (0.44 - 2.53)	—
70+	<5 (#)	8 (1.5)	#	#
Total	192 (16.1)	928 (19.1)	0.80 (0.68 - 0.93)	🡻

* 🡹 MSH statistically significantly higher than rest of Queensland; 🡻 MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 13. Hepatitis C (all cases) average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	<5 (#)	11 (1.7)	#	#
10-19	25 (16.5)	87 (13.4)	1.33 (0.84 - 2.12)	—
20-29	183 (99.6)	620 (87.0)	1.21 (1.02 - 1.43)	↑
30-39	155 (86.1)	547 (78.2)	1.14 (0.95 - 1.37)	—
40-49	106 (66.6)	441 (65.9)	1.01 (0.81 - 1.26)	—
50-59	65 (47.2)	323 (51.5)	0.90 (0.68 - 1.17)	—
60-69	33 (30.8)	177 (33.6)	0.90 (0.62 - 1.31)	—
70+	6 (5.6)	23 (4.1)	1.49 (0.59 - 3.77)	—
Total	577 (48.2)	2,230 (45.1)	1.10 (1.00 - 1.20)	—

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 14. Hepatitis C (newly acquired cases) average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	<5 (#)	<5 (#)	#	#
10-19	9 (6.2)	39 (6.0)	1.05 (0.50 - 2.18)	—
20-29	68 (36.8)	261 (36.6)	1.01 (0.77 - 1.33)	—
30-39	31 (17.1)	121 (17.2)	0.99 (0.65 - 1.49)	—
40-49	8 (5.3)	35 (5.2)	1.00 (0.46 - 2.18)	—
50-59	<5 (#)	6 (0.9)	#	#
60-69	<5 (#)	<5 (#)	#	#
70+	<5 (#)	<5 (#)	#	#
Total	117 (9.4)	462 (9.5)	0.99 (0.81 - 1.23)	—

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 15. Dengue fever average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	<5 (#)	<5 (<5)	#	#
10-19	<5 (#)	12 (1.9)	#	#
20-29	8 (4.4)	28 (3.9)	1.17 (0.52 - 2.67)	—
30-39	8 (4.6)	29 (4.1)	1.17 (0.52 - 2.61)	—
40-49	8 (4.8)	27 (4.0)	1.27 (0.55 - 2.93)	—
50-59	6 (4.6)	21 (3.3)	1.53 (0.61 - 3.85)	—
60-69	<5 (#)	16 (3.0)	#	#
70+	<5 (#)	11 (1.9)	#	#
Total	41 (#)	148 (2.9)	1.23 (0.86 - 1.77)	—

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 16. Ross River virus average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland6**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	<5 (#)	<5 (#)	#	#
10-19	6 (3.7)	59 (9.0)	0.36 (0.16 - 0.81)	↓
20-29	32 (17.4)	252 (35.4)	0.42 (0.29 - 0.60)	↓
30-39	60 (33.2)	442 (63.1)	0.45 (0.35 - 0.59)	↓
40-49	76 (48.1)	533 (79.7)	0.54 (0.42 - 0.68)	↓
50-59	60 (43.4)	461 (73.4)	0.53 (0.41 - 0.69)	↓
60-69	40 (37.3)	304 (57.7)	0.59 (0.43 - 0.82)	↓
70+	24 (22.7)	207 (37.6)	0.55 (0.36 - 0.84)	↓
Total	299 (25.3)	2,265 (44.3)	0.50 (0.45 - 0.57)	↓

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)
^ Note: Both valid and probable notifications are included in this table

Table 17. Barmah Forest virus average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland^**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	<5 (#)	<5 (#)	#	#
10-19	<5 (#)	6 (0.9)	#	#
20-29	<5 (#)	28 (4.0)	#	#
30-39	<5 (#)	43 (6.1)	#	#
40-49	5 (3.2)	61 (9.1)	0.29 (0.12 - 0.68)	🡻
50-59	6 (4.1)	55 (8.8)	0.40 (0.17 - 0.93)	🡻
60-69	<5 (#)	45 (8.5)	#	#
70+	<5 (#)	27 (4.8)	#	#
Total	25 (#)	264 (5.1)	#	#

* 🡹 MSH statistically significantly higher than rest of Queensland; 🡻 MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)
^ Note: Both valid and probable notifications are included in this table

Table 18. Potential rabies virus exposure average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	7 (4.2)	28 (4.3)	0.98 (0.41 - 2.35)	—
10-19	11 (7.5)	32 (4.8)	1.85 (0.91 - 3.79)	—
20-29	28 (15.2)	99 (13.9)	1.14 (0.73 - 1.76)	—
30-39	13 (7.4)	41 (5.9)	1.38 (0.72 - 2.64)	—
40-49	11 (7.1)	38 (5.6)	1.38 (0.69 - 2.76)	—
50-59	6 (4.1)	25 (4.0)	1.02 (0.40 - 2.59)	—
60-69	<5 (#)	17 (3.2)	#	#
70+	<5 (#)	8 (1.4)	#	#
Total	83 (6.9)	288 (5.8)	1.28 (0.99 - 1.65)	—

* 🡹 MSH statistically significantly higher than rest of Queensland; 🡻 MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 19. Potential ABLV exposure average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	<5 (#)	13 (2.0)	#	#
10-19	7 (4.4)	30 (4.6)	0.94 (0.40 - 2.21)	—
20-29	16 (8.7)	71 (10.0)	0.83 (0.48 - 1.45)	—
30-39	15 (8.3)	70 (10.0)	0.79 (0.45 - 1.40)	—
40-49	13 (8.2)	67 (10.0)	0.77 (0.42 - 1.41)	—
50-59	13 (9.4)	71 (11.3)	0.80 (0.44 - 1.45)	—
60-69	7 (6.2)	44 (8.3)	0.70 (0.31 - 1.58)	—
70+	<5 (#)	22 (4.1)	#	#
Total	75 (6.3)	389 (7.6)	0.78 (0.61 - 1.01)	—

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)

Table 20. Tuberculosis average annual notifications and rates per 100,000 population by age group, Metro South Health and Queensland (2018 – 2020), with rate ratio comparison between MSH and rest of Queensland**

Age group (years)	Average no. of notifications (rate per 100,000 pop.)		MSH compared with rest of Queensland	
	MSH	Qld - All	Ratio (95% CI)	Signif. difference*
<10	<5 (#)	<5 (#)	#	#
10-19	<5 (#)	9 (1.4)	#	#
20-29	18 (10.0)	39 (5.4)	2.60 (1.42 - 4.77)	↑
30-39	14 (8.0)	35 (5.0)	2.04 (1.05 - 3.95)	↑
40-49	5 (3.4)	22 (3.3)	1.01 (0.38 - 2.67)	—
50-59	6 (4.3)	16 (2.6)	2.05 (0.77 - 5.50)	—
60-69	6 (5.9)	15 (2.9)	2.72 (1.03 - 7.22)	↑
70+	8 (7.2)	18 (3.3)	3.07 (1.27 - 7.46)	↑
Total	60 (4.9)	155 (3.0)	1.98 (1.44 - 2.73)	↑

* ↑ MSH statistically significantly higher than rest of Queensland; ↓ MSH statistically significantly lower than rest of Queensland
— no statistically significant difference between MSH and rest of Queensland
Age group count of fewer than 5 too low for accurate rate calculation
** Age group data based on crude rates; Total rates are age-standardised (AU-2001)