Communicable Disease Surveillance Report

Fiscal Quarter 3
October 1 – December 31, 2020

Date: March 24, 2021

Labrador-Grenfell Health

Communicable Disease Surveillance Report

Disclaimer

The purpose of this report is to provide an overview of reportable communicable disease activity within the Labrador-Grenfell Health (LGH) Regional Health Authority. This activity is represented by case counts. The text of any disease that has exceeded the upper threshold for this quarter (calculated based on the previous 5 years) is coloured red.

Please note that due to continuous reporting, as well as potential delays in reporting, data is subject to change.

Diseases that Exceeded Threshold

LGH flags diseases that exceed an upper threshold. This is calculated using the 3rd quartile + 1.5 * interquartile range for each quarter, over the previous 5 calendar years. This may mean increased activity of this disease during this period.

During this quarter, two diseases exceeded the upper threshold: Cytomegalovirus, Hepatitis A

Disease Counts

Table 1. Enteric, Food, and Waterborne Diseases

	Current Quarter	YTD	YTD 2019	5-Year Historical Median	Upper Threshold
Amoebiasis	0	0	0	0	0
Botulism	0	0	0	0	0
Campylobacteriosis	1	3	13	0	5
Cryptosporidiosis	1	2	2	0	1
Cyclosporiasis	0	2	0	0	0
Cytomegalovirus	**3**	**7**	**1**	**1**	**2**
Giardiasis	0	3	5	1	2
Hepatitis A	**1**	**2**	**0**	**0**	**0**
Listeriosis	0	0	0	0	0
Salmonellosis	3	12	25	3	9
Shigellosis	0	0	0	0	0
Typhoid/Paratyphoid Fever	0	0	0	0	0
Verotoxigenic Escherichia coli	0	0	1	1	1
Yersiniosis	0	0	0	0	0

Table 2. Diseases Transmitted by Direct Contact and Respiratory Route

	Current Quarter	YTD	YTD 2019	5-Year Historical Median	Upper Threshold
COVID-19	0	7			
Creutzfeldt-Jakob Disease (CJD)	0	0	0	0	0
Group B Streptococcal Disease, Neonatal	0	1	0	0	0
Influenza Virus of a Novel Strain	0	0	0	0	0
Invasive Group A Streptococcal Disease	1	3	0	0	2
Invasive Haemophilus Influenza non-type B	0	0	2	1	1
Invasive Meningococcal Disease (IMD)	1	1	1	0	1
Invasive Pneumococcal Disease (IPD)	2	3	3	0	2
Legionelloisis	0	0	0	0	0
Meningitis, Bacterial (excl Hib, IMD, IPD)	0	0	0	0	0
Meningitis, Viral	0	0	0	0	0
Nontuberculosis Mycobacterial Disease	0	0	0	0	0
Severe Respiratory Illness, Unknown Origin	0	0	0	0	0
Tuberculosis, Non-respiratory	0	0	1	0	1
Tuberculosis, Respiratory	2	7	5	5	14
Tuberculosis (all)	2	7	6	6	15

Table 3. Sexually Transmitted and Blood Borne Infections (STBBIs)

	Current Quarter	YTD	YTD 2019	5-Year Historical Median	Upper Threshold
Chlamydia	47	205	171	42	61
Gonorrhea	1	1	0	1	2
Hepatitis C	2	10	12	1	8
HIV Infection	0	0	2	0	1
Syphilis, Infectious	0	2	0	0	0
Syphilis, Noninfectious	0	0	0	0	0

Table 4. Vectorborne and Other Zoonotic Diseases

	Current Quarter	YTD	YTD 2019	5-Year Historical Median	Upper Threshold
Lyme Disease	0	0	0	0	0
Malaria	0	0	0	0	0
Q Fever	0	0	0	0	0
Rabies	0	0	0	0	0
Toxoplasmosis	0	0	0	0	0
Trichinellosis	0	0	0	0	0
West Nile Virus	0	0	0	0	0

Table 5. Vaccine Preventable Diseases

	Current Quarter	YTD	YTD 2019	5-Year Historical Median	Upper Threshold
Congenital Rubella Syndrome	0	0	0	0	0
Hepatitis B	1	1	0	0	1
Invasive Haemophilus Influenza type B (Hib)	0	2	0	0	0
Measles	0	0	0	0	0
Mumps	0	0	0	0	0
Pertussis	0	0	0	0	0
Rubella	0	0	0	0	0
Tetanus	0	0	0	0	0
Varicella/Chickenpox	3	12	19	3	17

In Focus: Latent Tuberculosis Infection (LTBI)

About Tuberculosis

Tuberculosis (TB), an infectious disease caused by the aerobic, rod-shaped bacterium called *Mycobacterium tuberculosis* (*M. tuberculosis*), [1] is responsible for a significant burden of disease globally. TB is among the 10 leading causes of death in the world and is the leading single cause of infectious disease-related death, responsible for approximately 1.4 million deaths worldwide in 2019. [2]

Humans with active TB are the reservoir for *M. tuberculosis* and transmission usually occurs via the inhalation of infected respiratory droplets by an uninfected individual. [1, 3] Transmissibility is influenced by a wide variety of patient, pathogenic, and environmental elements such as disease type, *M. tuberculosis* strain and numbers in the host, distance from the infected host, length of exposure, and quality of ventilation in the environment. [3]

M. tuberculosis primarily infects the respiratory tract but can also spread hematogenously and cause extrapulmonary infections at any site in the body, as well as a disseminated systemic infection known as miliary TB. [1, 4]

When an individual is infected with *M. tuberculosis*, the infection may follow a few different courses. In an unknown proportion of those who are infected, the immune system successfully eliminates the bacteria and clears the infection. [3, 4] However, in the remainder of individuals, the infection persists. Among the individuals with persistent TB infection, about 5% progress to active TB disease shortly after the initial infection, known as primary TB. [3,4] The remaining 95% will develop LTBI, a state of equilibrium in which the immune system is able to contain, but not eliminate the bacteria, and the individual is asymptomatic and non-infectious. [3,4] From the 95% with LTBI, a further 5% will develop active TB sometime later in their life (> 18 to 24 months after initial infection), known as reactivation or secondary TB. [3] Ninety percent of those infected with M. tuberculosis never develop active TB disease. [3]

The most common symptoms of active respiratory TB include chronic cough, as well as constitutional symptoms such as night sweats and fever. [3] Symptoms of extrapulomonary TB depend on the specific site of infection. Diagnosis of active TB is usually made using one or more of the following: history, physical examination, chest radiography, sputum smear microscopy, mycobacterial culture, and nucleic acid amplification testing. [3] Active TB is treated with several

antibiotics, including isoniazid (INH), rifampin (RMP), Rifabutin (RBT), Rifapentine (RPT), Pyrazinamide (PZA), and Ethambutol (EMB). [3] Specifics of treatment regimens, as well as side effects, can be found in chapter 5 of the Canadian Tuberculosis Standards, 7th edition.

Globally, the development of drug resistant TB is a growing problem that has implications for treatment. [2] In Canada, the incidence of TB drug resistance is relatively low, with resistance to INH the most common in the samples tested, at 8.2% in 2015, although there is also a low amount of resistance to PZA, RMP and EMB observed in tested samples, in descending order. [5]

Latent TB infection (LTBI) is asymptomatic and non-infectious and can persist for the remainder of an individual's life. At some future date, if the host is no longer able to mount an effective immune response to contain the remaining bacteria, the infection can be reactivated to cause to active TB disease and then be spread to others. [3,4] The likelihood of reactivation is higher in individuals with compromised immune systems, such as those infected with HIV, who have a 100 times increased risk of developing TB, as well as other patients with immunocompromising medical conditions or who are taking immunosuppressant medications. [3,6]

Since LTBI is a silent infection, it is very difficult to detect. Currently, the tuberculin skin test (TST) and the interferon gamma release assay (IGRA) are used to diagnose LTBI in Canada, although it should be noted that these tests cannot differentiate active TB from LTBI. Therefore, active TB should be excluded before the initiation of LTBI treatment. [3,6] Routine or targeted screening for LTBI should be limited to those who are at higher risk of TB infection and reactivation. [3] Please see chapter 4 of the Canadian Tuberculosis Standards, 7th edition, for a full discussion of indications, administration, and interpretation of TST and IGRA testing.

Treatment of LTBI can decrease the likelihood of progression to active TB disease by up to 90%. [6] Although it is non-infectious, vigorous LTBI treatment is also a critical component of the WHO strategy to eliminate TB, as it reduces the reservoir and continued dissemination of *M. tuberculosis*, if the infection proceeds to secondary TB (which is infectious) in the future. [7] However, the potential benefits of treatment for both the individual and public health must be weighed against the side effect profiles of the medications used for treatment and the risk of harm to the individual. [7] Three different regimens are currently used in the Labrador-Grenfell Health region: INH, 3HP, and 4RIF. In the INH regimen, the patient self-administers isoniazid daily for 9 months. The 3HP regimen administers two medications, isoniazid and rifapentine, as directly observed prophylaxis (DOP), once weekly for 12 weeks. Finally, the 4RIF regimen consists of rifampin daily for 4 months. [3,6] Completion rates of therapy for active TB and LTBI are influenced by the duration of treatment, side effect profiles of the medications, and individual factors that affect patient adherence. [3] Usually, if the full initial course of treatment is completed, the patient is considered fully treated. However, if the initial attempt to treat is incomplete, a subsequent course is required ensure adequate LTBI treatment.

Epidemiology of TB infection and LTBI in the Global and Canadian Context

Globally, the incidence of TB is declining; however, TB continues to present a significant challenge in specific regions of the world that continue to report high active TB case rates. The number of active TB cases in 2019 was estimated at about 10 million, with most of these cases occurring in 30 countries, which account for 90% of cases. [2] However, the number of people with latent infections is estimated to be much larger. In 2014, the prevalence of LTBI was estimated at 1.7 billion individuals worldwide. [8]

Canada is considered a low-TB prevalence country by the World Health Organization (WHO), with a rate of less than 10 incident cases of active TB per year. [2] Case numbers and overall incidence rates of active TB, as well as TB-related deaths, declined in Canada over the course of the 20th century and up to 2010, when the active TB case rate was 4.6 cases per 100,000. [3] Incident rates of active TB have since shown a trend of increase, reaching 5.5 cases per 100,000 in 2019. [9]

TB disease is unequally distributed across Canada's population. Incidence rates of active TB are higher amongst males. [3] Incidence rates of active TB are also higher in the Canadian-born Indigenous and foreign-born populations compared to the Canadian-born non-Indigenous population. [3] Northern territories (Yukon, Northwest Territories, Nunavut) have the highest active TB incidence rates in Canada. [3] In 2016, Inuit had incident rates of active TB greater than 296 times those of Canadian-born non-Indigenous people. [10]

Incidence of LTBI is much less clear because, in Canada, LTBI has not been a reportable disease nationally and LTBI is more difficult to detect, making data scarce. However, for comparison, Nunavut, which has a population of approximately 38,000 people, had 300+ cases of LTBI in 2017. [11].

Epidemiology of LTBI in the LGH region, 2016 to 2020

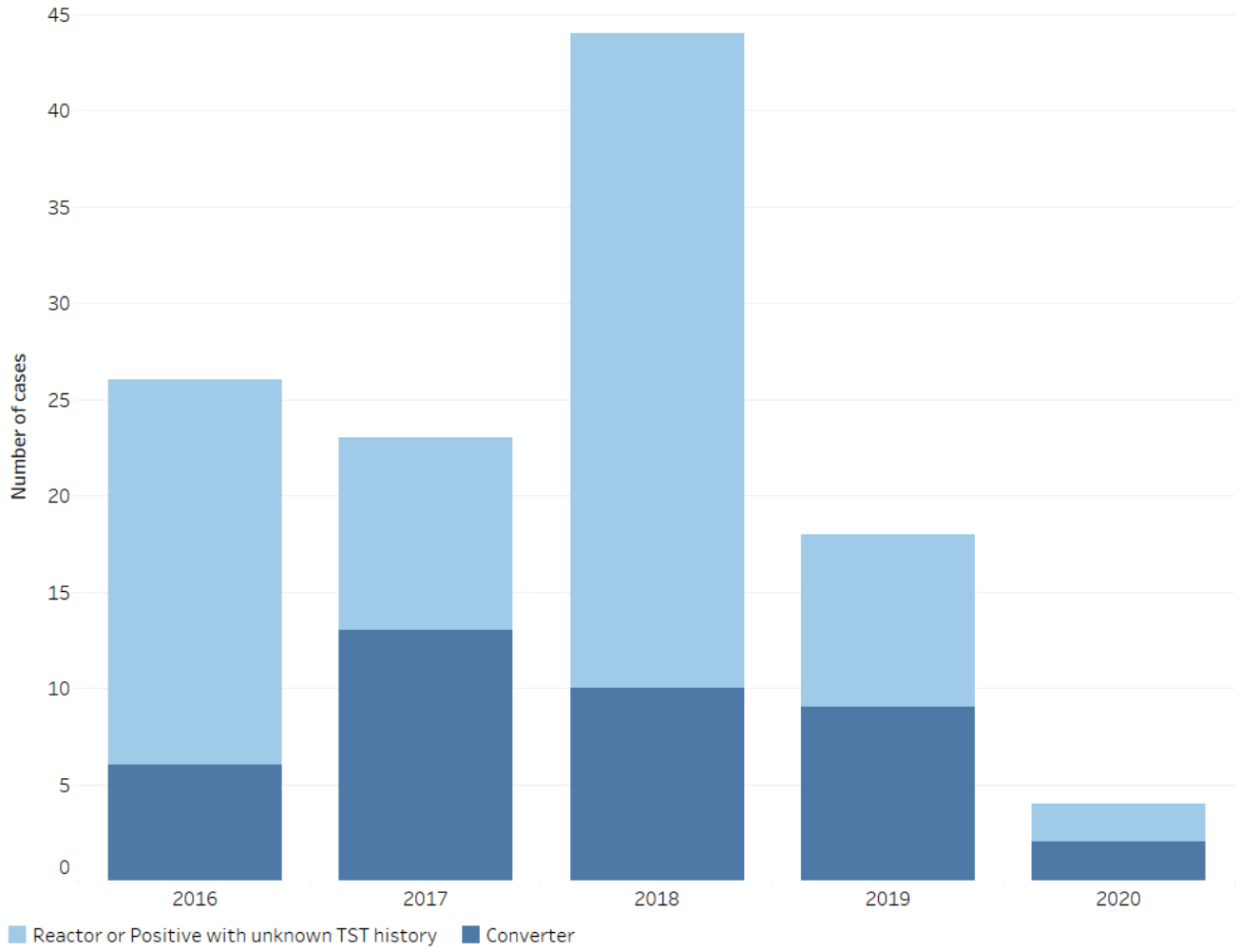
Note*: Incident/new LTBI cases* are defined as those not previously detected by the RHA, and can be further divided into TST converters, reactors, and positive results with unknown TST history. *TST Converters* are individuals with a new positive TST result and a negative TST documented within the previous 2 years. *TST Reactors* are individuals who have a new positive TST result a negative TST documented more than 2 years prior. Other new positives include those with a new positive TST, but with no documented history of previous TSTs, either negative or positive. *Previously diagnosed LTBI cases* are individuals diagnosed at some point in the past who were not treated, but who agreed to treatment during the time frame of this report (2016-2020).

Descriptive Epidemiology of Incident LTBI Cases

Between 2016 and 2020, there were 114 total LTBIs diagnosed in LGH. Thirty-nine (34.2%) of these were converters and 75 were reactors or had an unknown TST history (65.8%). Additionally, there were 24 previously diagnosed LTBIs assessed for treatment by public health. The highest number of LTBI cases was observed in 2018. See Figure 1 for a breakdown by year.

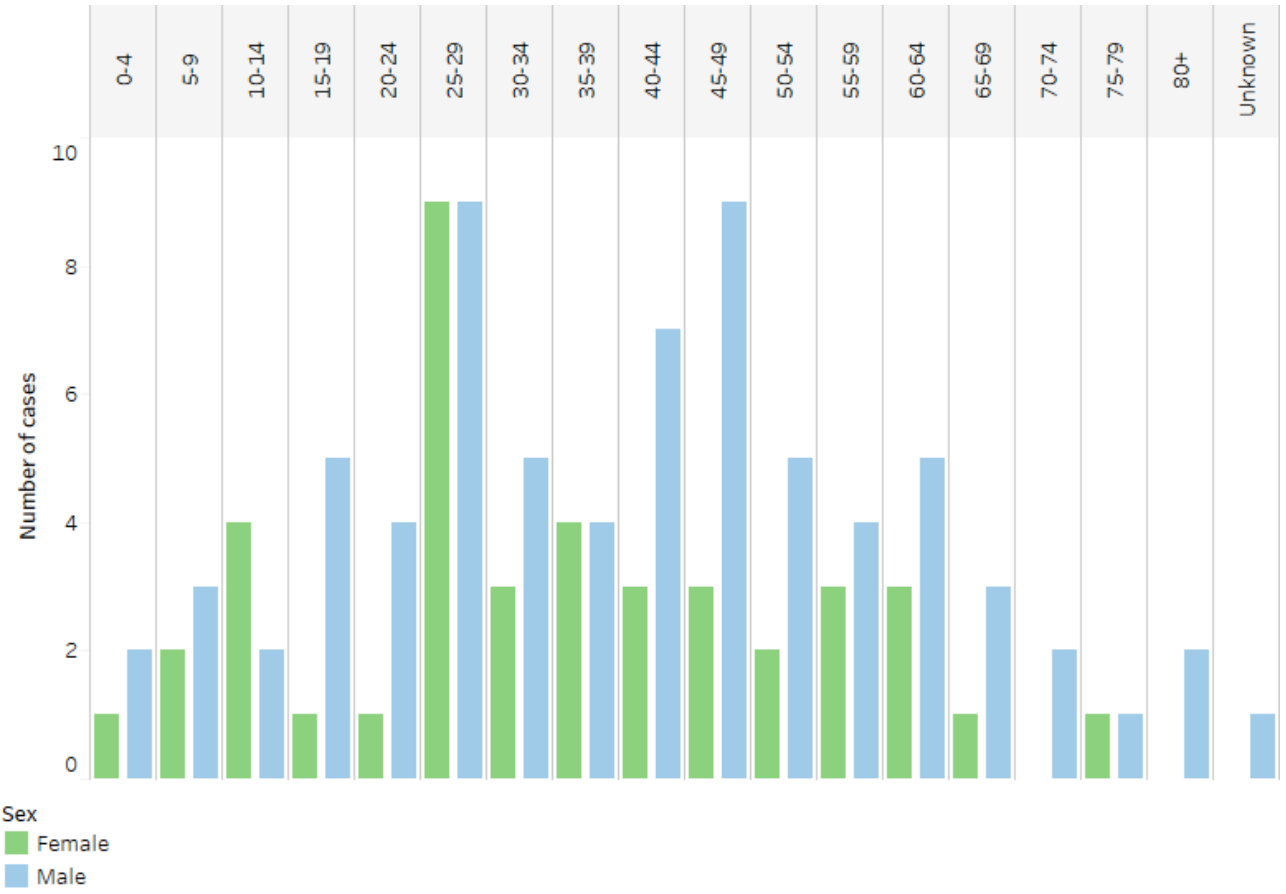
The majority of incident LTBI cases were detected via contact tracing (79.0%), many of whom were linked to outbreaks in Nain (2018) and Hopedale (2016-17). Three individuals initially started active TB treatment before active disease was ruled out and their diagnosis was changed to LTBI.

Figure 1: Incident LTBI cases over time, by TST reaction type (excludes previously diagnosed cases)
(n = 114)



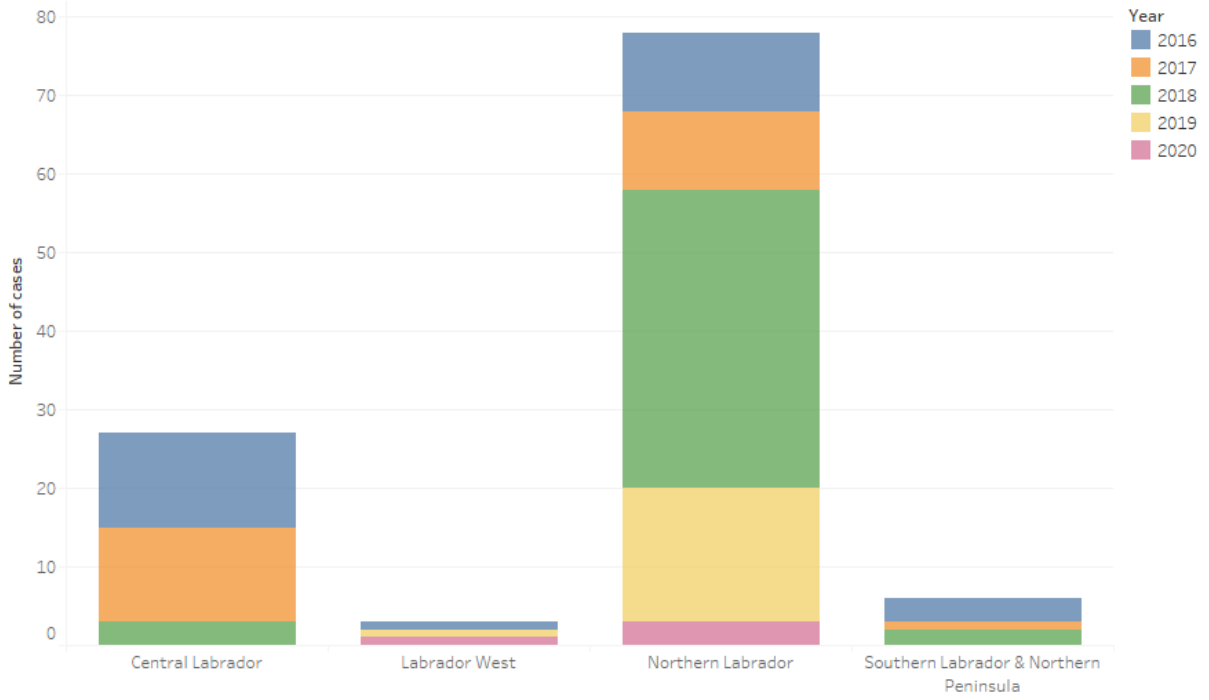
The distribution of incident LTBI cases by sex and age is provided in Figure 2. Of the incident LTBI cases diagnosed from 2016 to 2020, 64% were male (n = 73) and 36% were female (n = 41). The highest number of cases was detected in the 25 to 29 years old age group with an equal distribution between both sexes.

Figure 2: Age group and sex of incident LTBI cases, 2016-2020
(n = 114)



Overall, from 2016 to 2020, the highest number of incident LTBI cases were diagnosed in Northern Labrador, although in 2016 and 2017 the highest number of cases were diagnosed in Central Labrador (see Figure 3).

Figure 3: Incident LTBI cases by sub-region and year, 2016-2020
(n = 114)



Treatment of LTBI Cases

Between 2016 and 2020, 138 people were assessed for LTBI treatment: 114 incident LTBIs and 24 previously diagnosed LTBIs. Among these 138 people, 133 were eligible for treatment (96.1%), 115 started treatment (83.3%), and 102 completed treatment (73.9%) either during their first attempt or a subsequent attempt.

Among 24 previously diagnosed, all were eligible for treatment, and 21 started treatment. For those who started treatment, the interval between diagnosis and treatment initiation ranged from 1 to 35 years (mean = 8.9 years, median = 5 years); this excludes two individuals whose diagnosis dates were unknown.

Ten previously diagnosed LTBIs had records of incomplete LTBI treatment in the past (i.e., prior to the treatment attempt during 2016-20). The most common reason for not completing treatment in the past (noted in 5 records) was patient preference.

The treatment cascade in Figures 4 & 5 shows the pathway from diagnosis to treatment completion for individuals diagnosed with LTBI in the LGH region from 2016 to 2020.

There are a number of reasons for drops in the treatment cascade, including:

- Not eligible for treatment
    - 5 individuals listed as not eligible with 2 at high risk for hepatotoxicity, 1 pregnant, 1 with comorbidities and age, and 1 other.
- Did not start treatment
    - 18 individuals were eligible but did not start Directly Observed Therapy (DOP) - 17 of these were due to patient preference/refusal and 1 was lost to follow up.
- Incomplete treatment

- 22 courses of incomplete treatment were recorded - 18 first attempts at treatment, 3 second attempts, and 1 third attempt.
  - 10 stopped due to side effects (list drugs most common: 7 were taking 3HP, 2 9INH, and 1 4RIF)
  - 8 due to compliance
  - 3 due to patient preference
  - 1 unknown reason
- Half of individuals who did not complete their first course of treatment were male with an average & median age of 40y (range 20-61).

Figure 4: Overall LTBI treatment cascade, 2016-2020
(n = 138)

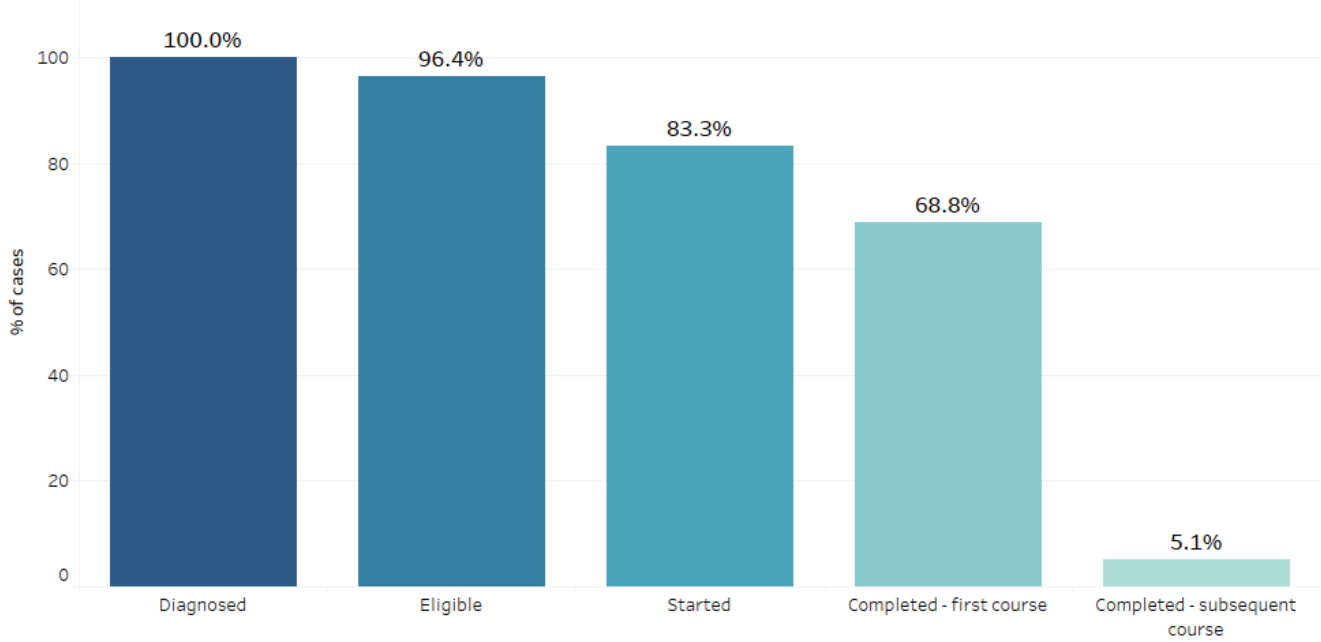
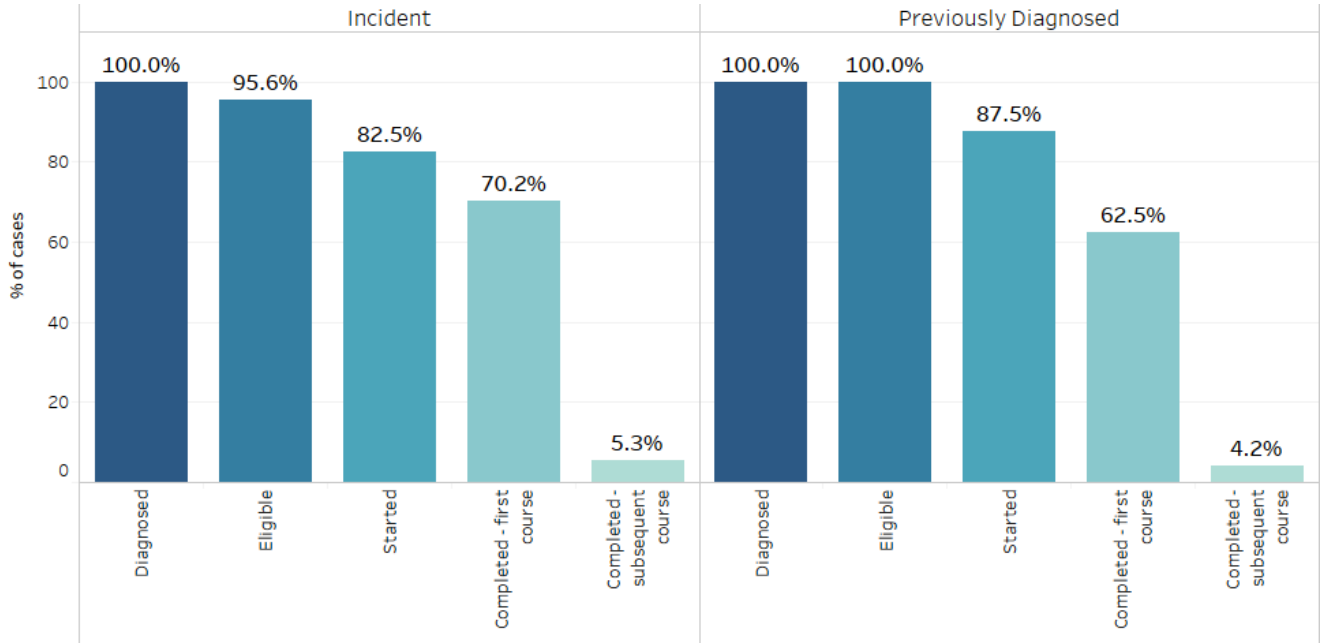
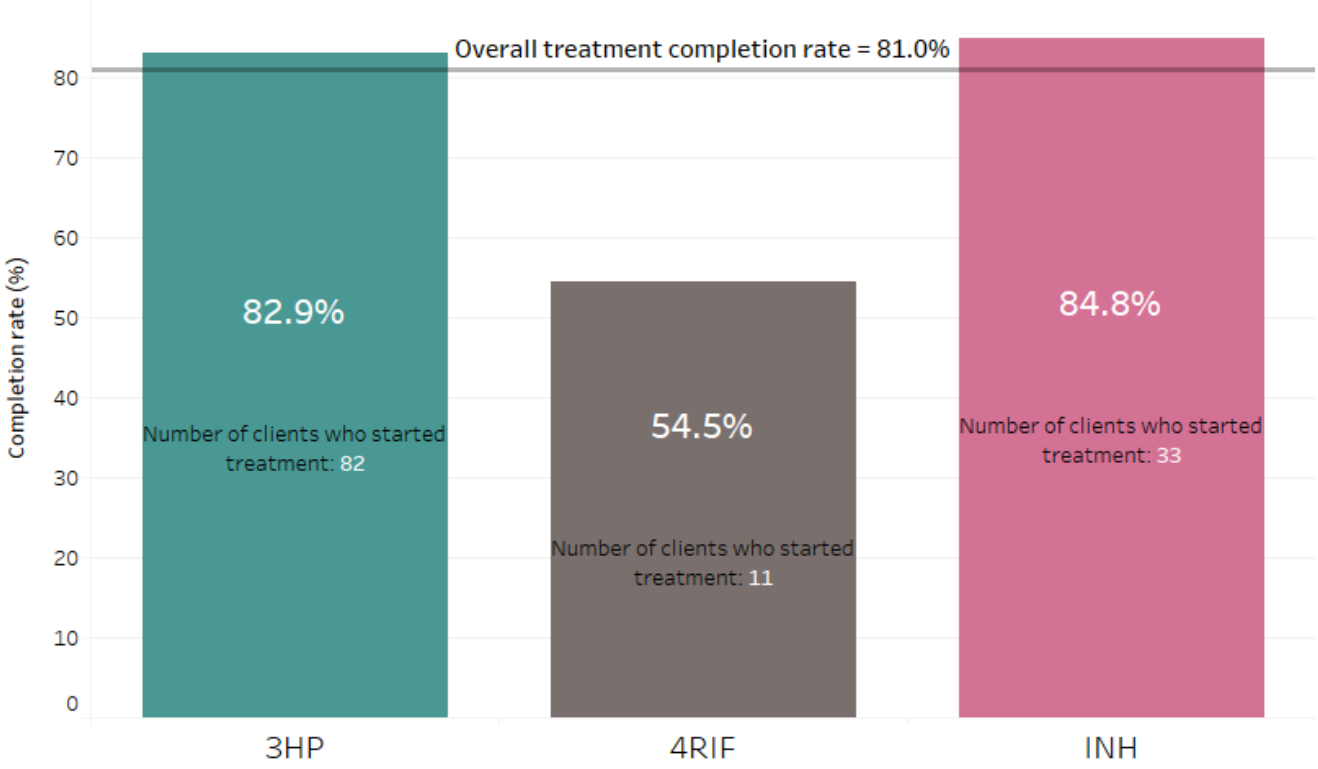


Figure 5: Treatment cascade by LTBI type, 2016-2020
(n = 114 (incident), n = 24 (previously diagnosed))



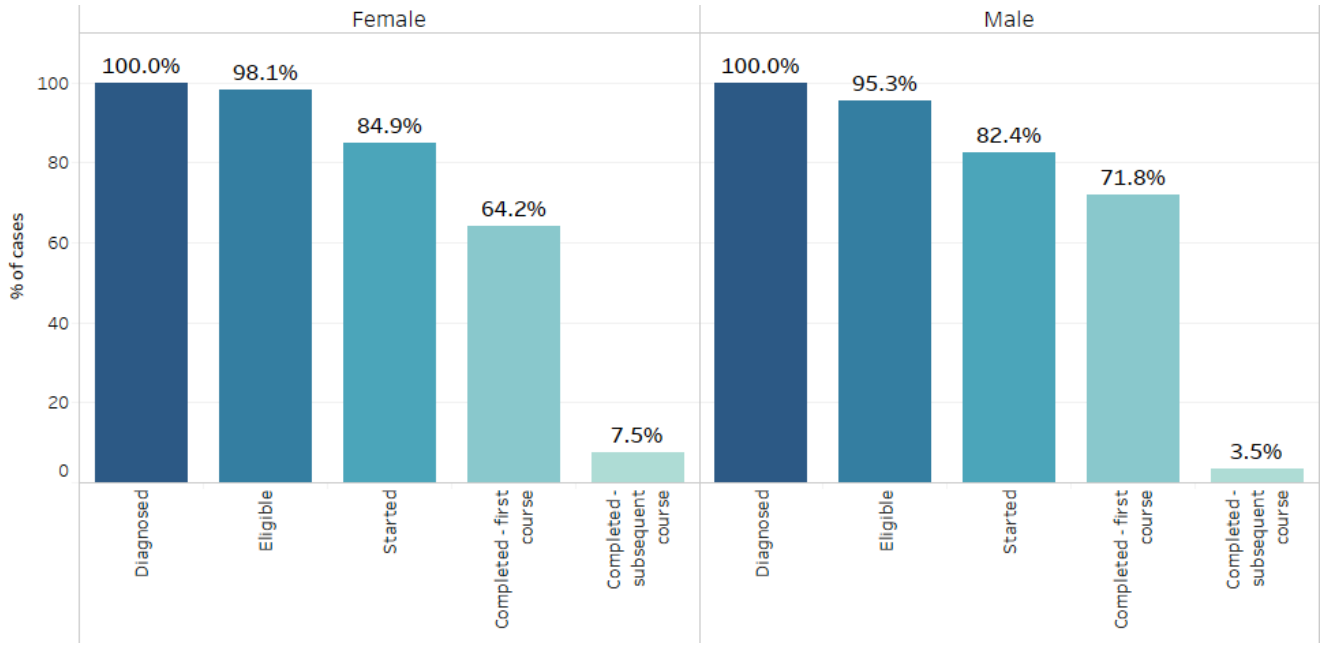
The highest treatment completion rates, by regime type, were for the INH regime and the lowest were for the 4RIF regime (see Figure 6), although the absolute number of patients treated with 4RIF (n = 11) was lower than those treated with 3HP (n = 82) and INH (n = 33).

Figure 6: Treatment completion rates by regimen type, 2016-2020



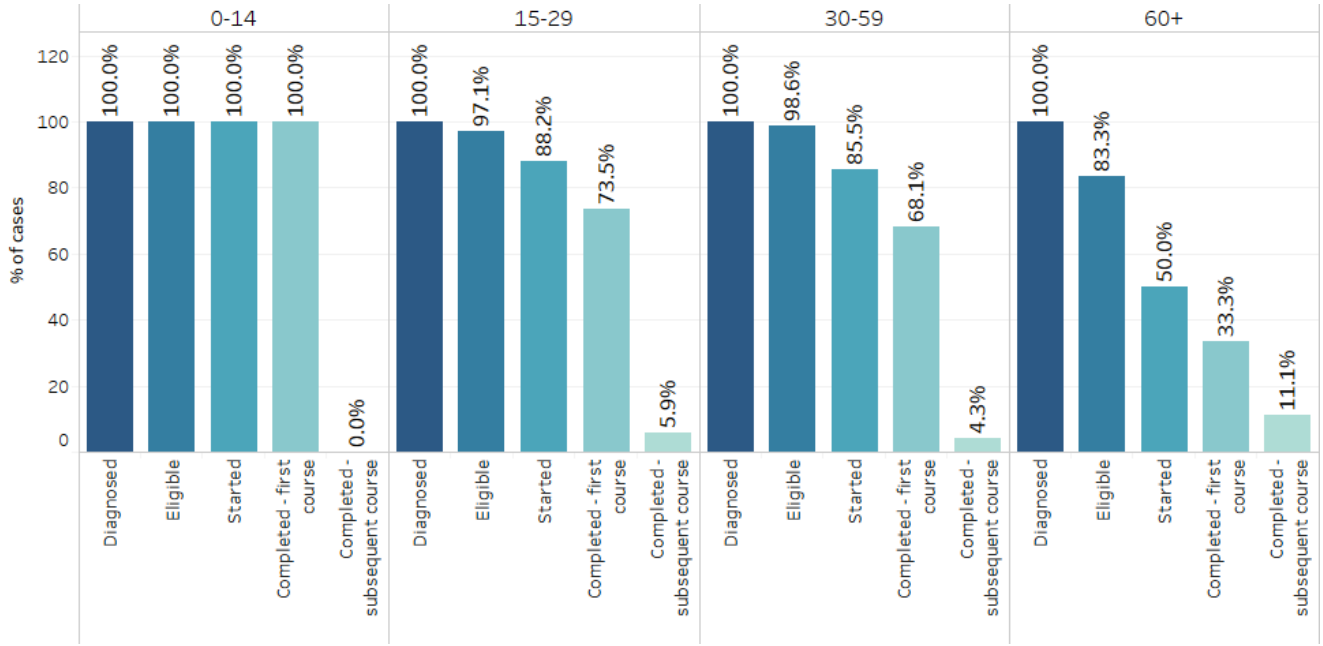
A comparison by sex (Figure 7) shows that females (n = 53) had a higher treatment initiation rate than males (n = 85), but a lower completion rate for the first attempt at treatment.

Figure 7: Treatment cascade, by sex, 2016-2020
(n = 53 (female), n = 85 (male))



When age groups are compared, as in Figure 8, the 0 to 14 years old age group had the highest treatment completion rates during the 2016-2020 period and, in all cases, completed the first course of treatment.

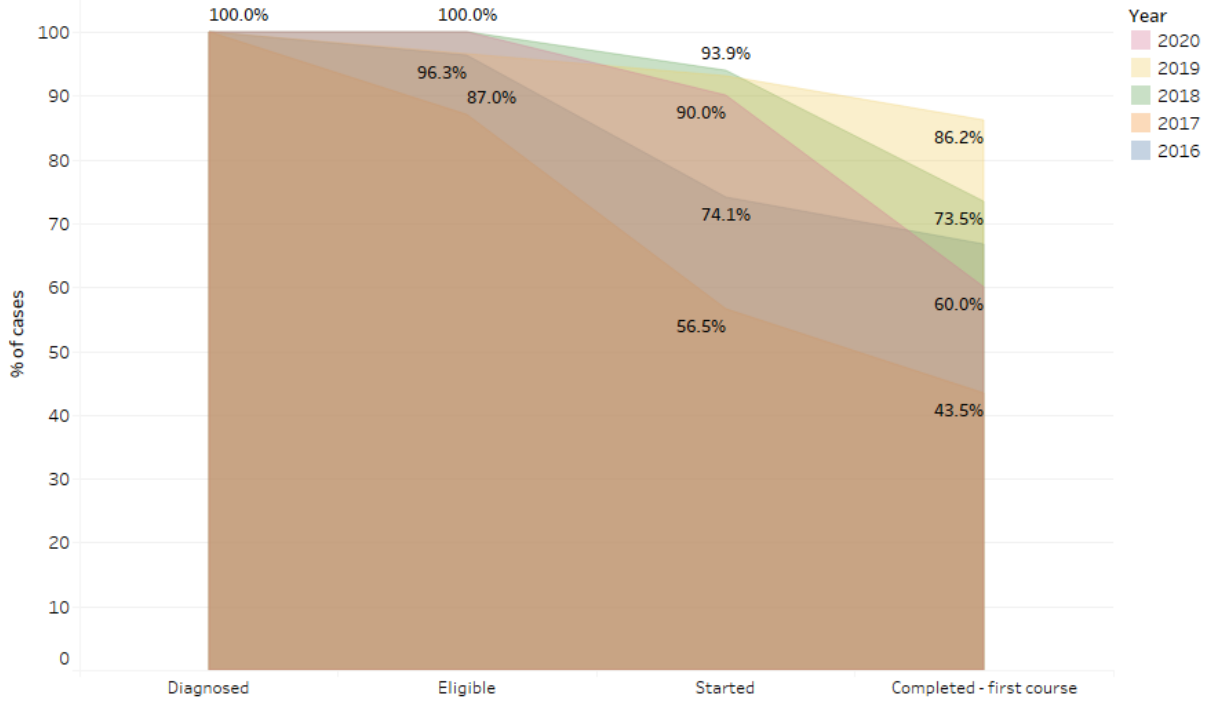
Figure 8: Treatment cascade, by age group, 2016-2020
(n = 14 (0-14), n = 34 (15-29), n = 69 (30-59), n = 18 (60+))



As Figure 9 shows, there is year-to-year variation in treatment initiation and completion rates; however, both treatment initiation and completion rates have generally improved over the past five years. For instance, in 2016, the treatment initiation rate was 74.1% and the overall treatment

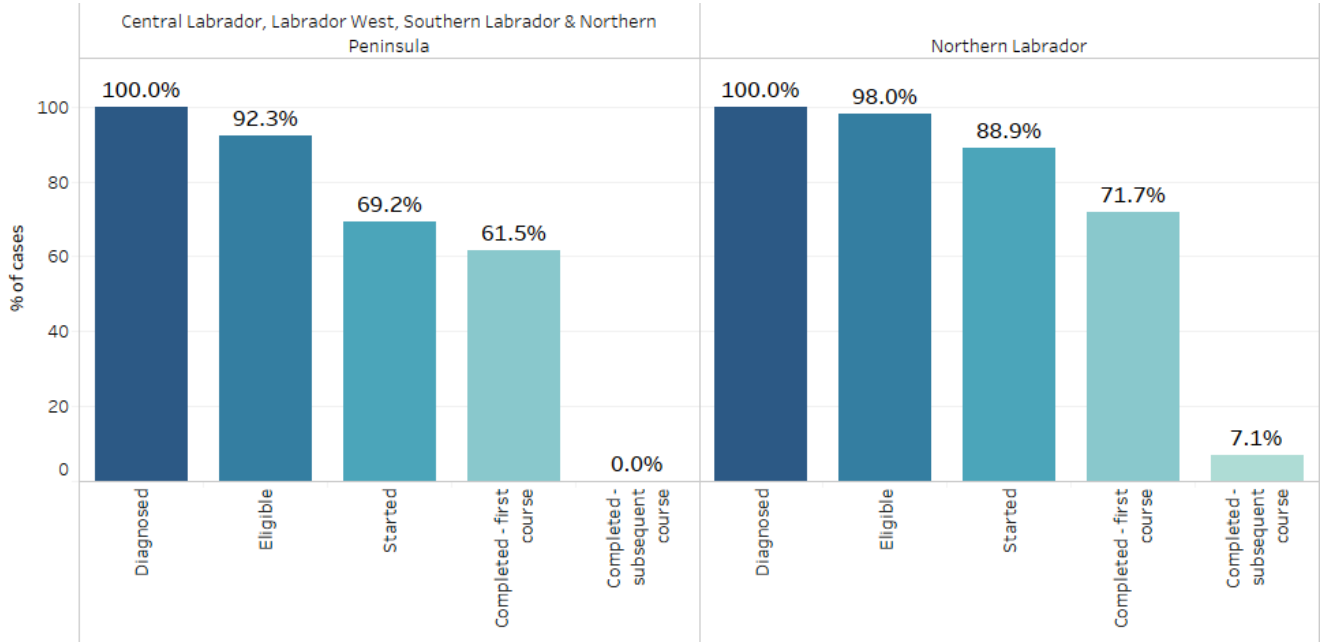
completion rate was 66.7%, while in 2019 the treatment initiation rate was 93.1% and the overall treatment completion rate was 89.7%.

Figure 9: Treatment cascade, by year, 2016-2020
(n = 27 (2016), n = 23 (2017), n = 49 (2018), n = 29 (2019), n = 10 (2020))



In a comparison between Northern Labrador, the region with the most LTBI cases (n = 99), and the remainder of the LGH region (n = 39), both initiation and completion rates were higher for Northern Labrador during the 2016-2020 period (see Figure 10).

Figure 10: Treatment cascade, by sub-region, 2016-2020
(n = 99 (Northern Labrador), n = 39 (Remainder of LGH region))



Summary

TB causes a significant burden of disease globally and is one of the top ten causes of death in the world. Although Canada reports a relatively low incidence of active TB cases, TB is still a concern for specific populations. TB disproportionately affects Canadian-born Indigenous people, particularly the Inuit of northern Canada, as measured by higher incidence rates of active TB. Data on LTBI is limited, but it is likely that there is some correspondence between rates of active TB and rates of LTBI. Decisions to treat LTBI must weigh the potential benefits for the individual and overall public health against the potential harms to the individual.

Between 2016 and 2020, 114 cases of LTBI were diagnosed in the LGH region. A majority of these cases were male and located in the Northern Labrador region, which has a population that is predominantly Indigenous. In terms of treatment, rates of initiation were 83.3% and rates of completion were 73.9%. Rates of both initiation and completion were highest in the Northern Labrador region. The treatment cascade was primarily affected by patient preference/refusal of treatment, side effects during treatment, and adherence to treatment.

Technical Notes

Data Sources

Latent Tuberculosis Infection Records. Communicable Disease Control Program. Happy Valley-Goose Bay, NL: Labrador-Grenfell Health [cited 2021 February 23].

Communicable Disease Control Reporting System, LGH terminal. Labrador City, NL: Labrador-Grenfell Health [cited 2021 January 15].

Government of Newfoundland and Labrador. Communicable Disease Control Reporting System, Department of Health and Community Services terminal. St. John's, NL: Department of Health and Community Services [cited 2020 October 8].

Definitions

5-Year Historical Median: Middle value of quarterly counts over the previous 5 calendar years.

YTD: Year-to-Date

Upper threshold: Calculated using the 3rd quartile + 1.5 * interquartile range for each quarter, over the previous 5 calendar years.

Incident/new LTBI cases: Cases not previously detected by the RHA, which are further divided into two subgroups - TST converters and TST reactors.

Previously diagnosed LTBI cases: Individuals diagnosed at some point in the past who were not treated, but who agreed to treatment during the time frame of this report (2016-2020).

TST Converters: Individuals with a new positive TST result and a prior negative TST documented in the last 2 years.

TST Reactors: Individuals who have a new positive TST result and have no prior negative TST documented in the previous 2 years.

Central Labrador: Region located in the Lake Melville area, which includes the communities of Happy Valley-Goose Bay, Sheshatshiu, North West River, and Mud Lake.

Labrador West: Region located in the western region of Labrador, which includes the communities of Labrador City, Wabush, and Churchill Falls.

Northern Labrador: Region spanning the northern coast of Labrador, which includes the communities of Rigolet, Postville, Makkovik, Hopedale, Nain, and Natuashish.

Northern Peninsula: Region stretching north from Bartlett's Harbour on the western side and Englee on the eastern side, up to the northernmost reaches of the Northern Peninsula of Newfoundland, which includes communities such as St. Anthony, Roddickton, and Flower's Cove.

Southern Labrador: Region spanning the southern coast and straits of Labrador, which includes all communities from Cartwright to L'anse-au-Clair.

Note

This report was prepared by Krista Baker, Public Health Information Management Analyst, Labrador-Grenfell Health, and Emma Cumming, Public Health Officer – Epidemiologist, Public Health Agency of Canada.

Any questions about this report should be directed to CDCintake@lghealth.ca

References

1.Kumar V, Abbas A, Fausto N, Aster J. Robbins and Cotran: Pathologic Basis of Disease, 8th ed. 2010.

2. Global Tuberculosis Report 2020 [Internet]. Geneva: World Health Organization; 2020 [cited 2020 November 30]. Available from: https://www.who.int/publications/i/item/9789240013131

3. Canadian Tuberculosis Standards, 7th ed. [Internet]. Ottawa: Public Health Agency of Canada; Feb 2014 [cited 2021 January 11]. Available from: https://www.canada.ca/en/public-health/services/infectious-diseases/canadian-tuberculosis-standards-7th-edition.html

4. Flynn JL, Chan J. Tuberculosis: Latency and Reactivation. Infect Immun [Internet]. Jul 2001[cited 2021 January 11]; 69(7): 4195-4201. Available from: https://iai.asm.org/content/69/7/4195

5. Tuberculosis: Drug Resistance in Canada 2015 [Internet]. Ottawa: Public Health Agency of Canada; Feb 2017 [cited 2021 February 24]. Available from: https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/diseases-conditions/tuberculosis-drug-resistance-canada-2015/tuberculosis-drug-resistance-canada-2015.pdf

6. Kiazyk S, Ball TB. Latent Tuberculosis Infection: An Overview. Can Commun Dis Rep [Internet]. 2017 [cited 2020 November 30]; 43(3): 62-6. Available from: https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/publicat/ccdr-rmtc/17vol43/dr-rm43-3-4/assets/pdf/17vol43_3_4-ar-01-eng.pdf

7. Campbell JR, Dowdy D, Schwartzman K. Treatment of latent infection to achieve tuberculosis elimination in low-incidence countries. PLoS Med [Internet] 2019 [cited 2021 February 26]; 16(6): e1002824. Available from: https://doi.org/10.1371/journal.pmed.1002824

8. Houben RMGJ, Dodd PJ. The Global Burden of Latent Tuberculosis Infection: A Re-estimation Using Mathematical Modelling. PLoS Med [Internet]. Oct 2016 [cited 2021 January 11]; 13(10): e1002152.

9. Global Tuberculosis Programme. TB Burden Estimates, 2000-2019 [Data file]. Geneva: World Health Organization [cited 2020 November 18]. Available from: https://www.who.int/teams/global-tuberculosis-programme/data

10. Vachon J, Gallant V, Siu W. Tuberculosis surveillance in Canada, 2006. Can Commun Dis Rep [Internet]. 2018 [cited 2020 November 30]; 44(3/4): 75-81. Available from: https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2018-44/issue-3-4-march-1-2018/article-1-tuberculosis-2016.html

11. Patterson M, Finn S, Barker K. Addressing Tuberculosis among Inuit in Canada. Can Commun Dis Rep [Internet]. 2018 [cited 2020 November 30]; 44 (3/4): 82-5. Available from: https://www.canada.ca/content/dam/phac-aspc/documents/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2018-44/issue-3-4-march-1-2018/ccdrv44i03a03-eng.pdf